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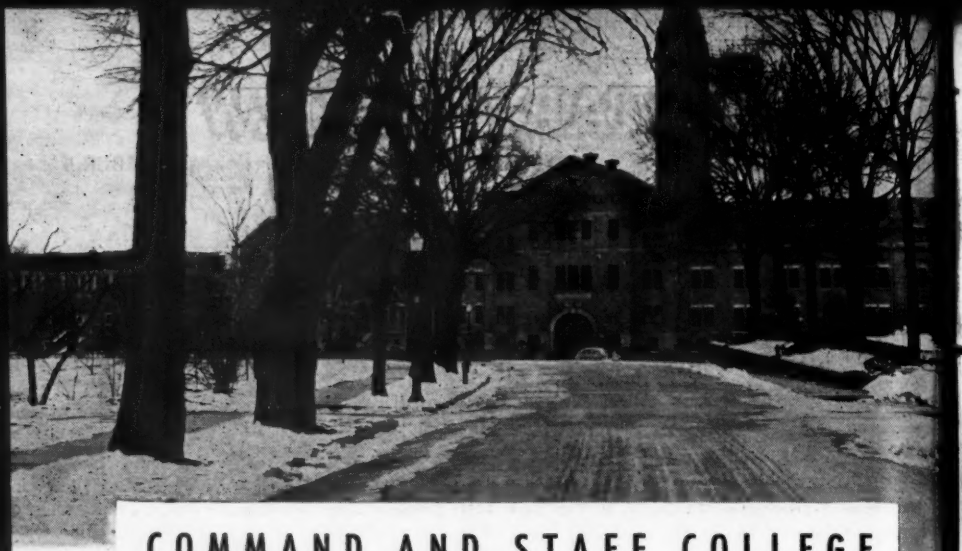

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Guarding Prisoners of War in Germany

MAJOR GENERAL D. A. STROH, *United States Army*
Former Commanding General, 106th Infantry Division

SUCH was the mission assigned to the 106th Infantry Division by the Commanding General, Fifteenth United States Army on 15 April 1945. It was to develop into as unique and unprecedented an assignment as probably has ever been given to a unit of similar type and size. Eventually expanded to a total of 40,000 officers and men, the division at its peak guarded a maximum total of nearly 920,000 German prisoners of war, and processed more than a million and a quarter through its enclosures during a period of about eleven weeks.

The orders could not have come at a worse time from the standpoint of the 106th. By no stretch of the imagination could the division have been considered a first class unit at the time.

The 106th had been hard hit in the Ardennes only four months before. Reduced to little more than a reinforced regimental combat team, the division had fought its way back across Belgium, occupied a defensive sector on the extreme southern flank of the First United States Army, and participated in the start of the final victorious American offensive early in March. The division was then sent back to Rennes, France for the purpose of rebuilding preparatory to resuming its place in combat. Some 8,000 replacement officers and men were received early in April to replace the two infantry regiments, two light artillery battalions and the reconnaissance troop which had been lost. Training of these reconstituted units was scheduled to begin on 16 April.

Pending the availability of the reconstituted units the 3d and 159th Infantry Regiments and the 401st and 627th Field Artillery Battalions, just arrived from the United States, were attached to the division about 10 April. The personnel and capabilities of these units were almost completely unknown to the division commander. The division with such attachments was to supervise the formation and training of its organic elements and at the same time to act as the tactical reserve for the 66th Infantry Division, then containing the German garrisons in the St. Nazaire and L'Orient pockets, preparatory to taking over the mission of that division on 5 May. Between 15-18 April, one field artillery battalion, attached to the 66th Infantry Division, was in action, and one infantry regiment was on a 5-hour alert, ready to move to the pocket.

Such was the unsatisfactory situation confronting the 106th when on 15 April orders were received to move to the Rhine Valley and take over the task of guarding German prisoners of war. The depleted division with attached units only would move to the east. The reconstituted units would remain at Rennes and continue their training under the supervision of a division training group. These units moved to the vicinity of Mayen the latter part of May.

On this date American armies were far across the Rhine and probing the western banks of the Elbe. Prisoners of war were being sent to the rear by the hundreds of thousands from the army cages to installations provided by the Communications Zone. The situation in the rear was not only desperate but on the verge of geting completely out of control. Communication Zone was almost completely destitute of troops in adequate numbers for guard purposes. Neither Conad (Continental Advance Section), supporting the Sixth Army Group (Seventh United States and First French Armies), on the south, nor Adsec (Advance Section), supporting the Twelfth Army Group (First, Third, and Ninth United States Armies) on the north, were in position to receive the vast hordes of bedraggled German soldiers who were streaming to the rear by convoy and train. Both Sections were fully involved in their vast commitments of sup-

porting the onrush of the victorious American Armies. The 106th Division was thrown into the maelstrom at a very critical period, and as it happened, just in the nick of time.

Small division liaison groups left Rennes on 16 April for Conad and Adsec Headquarters, respectively near Mannheim and at Bonn. The 159th Infantry left Rennes on 17 April and completed the 600 mile trip by motor and rail in five days, closing at Remagen on 21 April. The remainder of the division followed by daily echelon closing on the Rhine by 25 April.

It had been decided tentatively to deploy the division in four general groups, respectively, in the rear of the four American Armies then in operation. The division artillery (401st, 591st, 592d and 627th Battalions), would support Conad and be employed to receive prisoners captured by the Seventh United States Army. The 424th Infantry, the 159th Infantry, and the 3d Infantry would support Adsec and receive prisoners respectively from the Third, First and Ninth United States Armies from south to north. The division itself, while remaining assigned to the Fifteenth United States Army, was attached to ComZ. Considering the training responsibility still in existence at Rennes, 600 miles to the west, it is difficult to imagine a more complicated picture.

Orders received by the division contemplated that one American soldier would guard fifty prisoners, and that since the division, as initially constituted on the Rhine, was presumed to consist of 15,000 officers and men, the guard potential was computed at 750,000 prisoners. Inasmuch as all personnel of the division were not by any means available for guard purposes this computation was, to say the least, optimistic. The number of division personnel actually available to stand watch in the guard towers and to patrol the perimeter fences probably did not number much in excess of 4,000, so that the average number of prisoners guarded per man was closer to 150. This fact, coupled with the almost total absence of a formed reserve, for use in an emergency, and the fragile nature of many of the enclosures, gave the division commander many a sleepless hour. Such fears, however, proved groundless, as the prisoners proved to be extremely docile and well-behaved.

It was estimated that the guard potential of the division would not be adequate, since at least a million and a quarter prisoners were expected. Accordingly the division was reinforced by 10,000 individual replacements, together with three provisional guard battalions which had been operating directly under ComZ control. These were hastily improvised outfits of approximately 1,000 men and officers each. They had been thrown together about three weeks before without adequate leadership, training, equipment or organization. The replacements were attached by the division at the rate of 100 men each to every company of infantry and battery of artillery, leaving a reserve of about a thousand for employment with the division troops as additional service personnel and as a pool to replace losses in the combat elements. As thus reinforced the division was considered to have a total of fifteen battalions of infantry, or the equivalent, and four battalions of artillery for guard purposes. Each regiment was directed to form a provisional battalion consisting of its cannon and antitank companies and elements of the regimental headquarters company. As a rough rule of thumb each infantry battalion, reinforced, was considered to have a guard potential of 90,000 prisoners, and each field artillery battalion, of 65,000. The division potential was thus set at 1,500,000.

The division area was divided into four sub-areas, referred to respectively as Red, White, Blue, and Green. North to south the three infantry regiments were to occupy the three northern areas and the division artillery the southern-most area. Each unit commander was made responsible for all prison enclosures within his area, with instructions to employ normally one battalion,

reinforced, as the guard of each of the enclosures to be occupied.

While these dispositions were in progress, during the later days of April, the Third United States Army changed the direction of its advance from the east to the southeast. This resulted in a change of plans, since it was then contemplated that the bulk of the prisoners could be expected in the Blue area, rather than an equitable distribution between all four areas. Accordingly the disposition of the division was changed to conform to the tactical movements of the combat troops. By 1 May the four areas were occupied as follows.

Red: 3d Infantry (less 2 battalions) with 6950th Guard Battalion attached, guard potential 250,000.

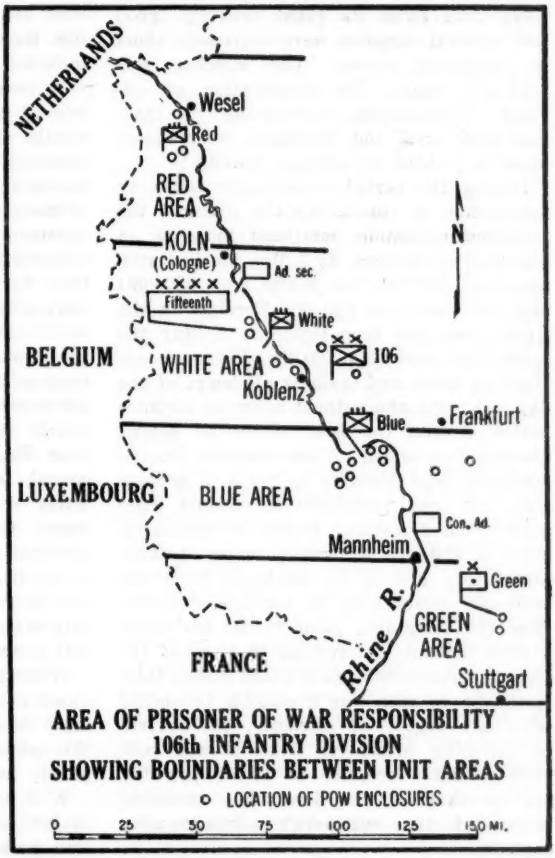
White: 159th Infantry with 6951st Guard Battalion attached, guard potential 400,000.

Blue: 424th Infantry with 2 battalions 3d Infantry and 6952d Guard Battalion attached, guard potential 600,000.

Green: Division artillery, guard potential 250,000.

These dispositions were not materially changed for the next six weeks.

Seven enclosures, containing 165,000 prisoners were taken over initially by the division, commencing with that at Sinzig by the 159th Infantry on 22 April. The situation on that date was anything but satisfactory. Practically all of the enclosures consisted only of areas of ground surrounded by a single barbed wire fence. Most were completely destitute of shelter of any description except for scraps of canvas, boards or tin. Guard towers were absent at most places. The water supply into the enclosures had either not yet been completed or was completely inadequate. An enclosure at Remagen, designed ultimately to accomodate 100,000 prisoners had been only half completed and was occupied to double its capacity. Ten thousand prisoners of war were on sick report at this enclosure. A new enclosure was established at Buderich, just south of the Dutch frontier. Roads leading to the enclosure in all directions were clogged with truck convoys filled with pris-



oners sent to the rear by the Ninth United States Army, in charge of the military police of at least nine different divisions. Seven trains of prisoners were reported east of the Rhine awaiting an opportunity to cross the only bridge. During the first afternoon of the occupancy of this camp, which was far from being complete, a total of 35,000 prisoners were counted through the gates. An enclosure in the Blue area contained more than twice its rated capacity. Food and medical supplies were extremely short or completely absent. The weather was cold and rainy. The combination of adverse circumstances confronting the inexperienced area and enclosure commanders posed a problem of extreme gravity.

During the period immediately following assumption of control by the division, the prisoner population continued to grow in tremendous numbers. By 3 May the Red area contained 129,000; the White area 250,000; and the Blue area 160,000. Receipts in the Green area had been light. By 7 May the totals had grown to 780,200. Prisoners arrived by truck and train at all hours of the day and night and without adequate advance notice, despite the best efforts of higher headquarters to control the situation. Guards accompanying prisoners by train in general were not made available to conduct prisoners from detraining points to enclosures, often a distance of several miles. Guards accordingly had to be employed from the enclosure complement to conduct prisoners from the detraining point to the enclosure, a most difficult undertaking in view of the already serious shortage of guard troops. Only in the Green area was it possible to control with any degree of efficiency, the arrival of incoming prisoners. Here it was possible to limit reception to 10,000 per day and to shut off the flow when reception over-taxed the enclosure's administrative capacity.

New enclosures were opened as required. Eventually the division manned sixteen at one time stretching on a front of 340 road miles generally along the valley of the Rhine. The prisoner population peak was reached 18 May when 917,217 were in custody. Inflow ceased abruptly thereafter. The motley crowd of prisoners behind the barbed wire included men of at least eighteen different nationalities, of all ranks, of all shades of political affiliations, of both sexes, and of all ages. Twenty-six hundred women, representing the equivalent of our WACs and nurses, were in custody at one time. Sixty-eight field marshals and general officers were confined in one building. Boys of seven and men of eighty were included.

It became evident at once that organization of prisoners within each enclosure was vitally necessary if reasonably smooth administration was to be accomplished. Higher headquarters had authorized the organization of cadres in unlimited numbers, composed of noncommissioned officers and privates. The internal organization of each enclosure was thus facilitated materially. Group leaders were given a considerable degree of authority under division supervision and in general performed their assignments admirably. The German camp commander in one of the most efficiently administered enclosures where nearly 100,000 were in confinement was a first class private. German medical personnel, including nurses, were used extensively in the enclosure hospitals and dispensaries. German finance officers handled the payment of dischargees, German clerks prepared discharge and other evacuation papers, and German cooks of course handled community messes. Organization in all enclosures was complete by 19 May.

With the exception of a surprisingly small number who attempted to escape in the early days, the attitude and conduct of the prisoners throughout was cooperative, docile, and completely amenable to American control.

With the advent of better weather early in May, conditions began to improve. American personnel gained experience; the flow of prisoners was put under reasonable control; the supply situation improved; cooking facilities were made available, and the camps were organized by the Germans themselves under American supervision. By the middle

of May the crisis had been passed and from then on a new phase of the operation began. This was the gradual emptying of the enclosures due to transfer, evacuation and discharge.

Transfers of prisoners to the west, to be employed largely as laborers in France, but also for other purposes, began shortly after 5 May, when preparations were begun to ship 20,000 by rail to the Oise and Normandy Base Sections. Prisoners were shipped at the rate of forty men per "40 and 8" box car, care being taken that no American built cars were employed, which could not be adequately ventilated. Prisoners were segregated by categories into males, females, officers, noncommissioned officers, and nationalities as required, and screened by counter-intelligence teams. Rosters in six copies for each train shipment were required. The division was made responsible for the safety and administration of each shipment until the destination had been reached, despite the fact that such destinations were usually several hundred miles distant. To provide for the necessary guards twenty-six escort guard companies and six detachments were attached to the division. The division also stocked the train with the necessary rations for all personnel for the entire trip. Transfers of this type reached large proportions (95,000 during June alone) in subsequent weeks.

Enclosures were also depleted by transfers of displaced persons and other civilians who were found to be included among the military prisoner personnel. Progress in the evacuation of such personnel was slow, there remaining in custody some 19,000 German civilians by 2 June. Eventually all were released, and transported to their homes or vicinity thereof.

Transfers of military prisoners between enclosures and between areas to facilitate eventual discharge, and to areas from which American troops would be withdrawn, eventually ran into the hundreds of thousands. Between 31 May and 12 June alone nearly 60,000 were transferred to the zone eventually taken over by another power. Some transfers of this type were effected by marching, some by truck, but most by rail. Shuttle trains for the purpose were operated between the Red, White and Blue areas for a considerable period.

By far the greatest administrative load, and the operation which resulted in the greatest decrease in prisoner populations were discharge processing and the transportation of discharged prisoners to their home *kreis* capital or county seat.

As early as 18 May plans were under way for discharge processing on an extensive scale. On that date a small group of prisoners was selected at one of the Blue enclosures for discharge and transportation to the Mainz *Kreis*. This was employed as a trial to test the system and to train processing personnel. From among the group those prisoners were selected whose professions in civil life were involved with agriculture, transportation, or mining. From among these, those residing in the Mainz *Kreis* were segregated. The resulting group was then screened for the elimination of the politically undesirable and other categories.

The names of the remainder were compared to the "SHAEF Personality Card Index," for the elimination of still other undesirables. Those who still remained were considered dischargeable. The necessary discharge papers were then prepared on German typewriters by German clerks; the dischargees were paid in German marks drawn from a German bank by a German finance officer; and finally they were transported by truck to their home county seat and delivered to the local mayor after authority was obtained from the American army commander concerned.

This system, in all essentials, was adopted throughout all areas. With experience and practice, it was found that one IPW (interrogation of Prisoners of war) team of two officers and four enlisted men, assisted by the necessary German finance and clerical personnel, could process for discharge not less than 500 prisoners per enclosure per

day, or a total of 9,000 per day for the division area.

Transportation of these numbers constituted a major problem. In the early stages, deliveries of discharged prisoners were limited to those kreis capitals which were located in a belt roughly 100 miles in width and bisected by the Rhine, known as the "Retail Zone." Deliveries in this zone were made by truck if the destination was within fifty miles of the enclosure. Prisoners confined in one area, who resided in another, were shipped by train to the enclosure nearest their homes, and delivered from there by trucks by the local commander. Hundreds of vehicles were operated by division personnel on an average of twenty hours per day, seven days a week. Retail delivery of all dischargeable prisoners was completed in a little more than four weeks.

Shortly after retail deliveries commenced, authority was received to begin "wholesale" deliveries into the area then occupied by the Ninth United States Army, later extended to include the areas of the Third and Seventh United States Armies. Original directives contemplated that such deliveries also would be by truck, direct to *kreis* capitals. Because of the vast distances involved this was wholly impracticable. Early in June the Ninth United States Army established reception centers at Hamm, Hesslinger, Lollier, and Erfurt, to be followed shortly thereafter by the establishment of similar centers by the other two armies. The division delivered fully processed prisoners to these reception centers, usually by rail, and the armies completed local delivery therefrom. Receipts at each reception center were initially limited to 1,000 in each twenty-four hours. This was uneconomical in train capacities, and did not keep abreast of the rate of discharge at division enclosures. Accordingly, some of the reception centers were later expanded so as to receive as many as 10,000 dischargees per day.

The rate of discharge increased rapidly as the machinery became oiled and settled down to a smooth routine. Within two weeks from the date of discharge of the first prisoner a total of nearly 15,000 had been released, and the discharge rate per day was exceeding 6,000. By 7 June nearly 80,000 had passed through the discharge mill and had been transported to their homes. During the period 4-7 June the rate of discharge averaged 9,112 per day. During this month 243,120 prisoners were discharged. The peak discharge day was 24 June, when 19,051 were processed and shipped.

As has been stated, original authorization for discharge was limited to agricultural and transportation workers, and miners, these being the labor categories most desperately needed in Germany. Early authorization also included women, men of fifty years of age or older, and those who had received maximum hospitalization. Labor categories were later expanded widely. By the latter part of June nearly every trade and profession were represented among the dischargees.

On many occasions the rate of discharge at the enclosures exceeded both rail capacity for shipment and authorization for receipt in army areas. Large backlogs piled up at all enclosures. Rail congestion was partially relieved by the organization by the division of truck convoys of ten-ton semi-trailers, in which thousands of prisoners were evacuated to all parts of the American zone. Deliveries were first completed to the area of the Ninth United States Army, and later, as authorization was received, to the Third and Seventh.

By 17 June the prisoner population still in custody of the division had been cut to less than 450,000, about half of the peak load. In addition to the decrease in total numbers, the prisoners remaining had been combed for the elimination of those who could not be kept in custody in the division enclosures. Twenty-two thousand Czechs and 6,000 Russians had been segregated in the Blue area. These were evacuated completely by 23 June. Shipment of other special nationals (French, Belgians, Dutch, British, Poles, Yugoslavs, Italians and Greeks) to the west had begun early in June, and had been completed by 10 June. These numbered in the neighborhood of 50,000.

By the middle of June therefore, the task confronting the division had settled into a well oiled routine, despite the fact that thousands of low-point division personnel were being transferred to other divisions for redeployment, and their places filled by veteran officers and men, but inexperienced in POW activities. Prospects appeared bright that the prisoner population could be reduced in two or three weeks to that number of non-dischargeable categories, estimated at about 350,000, which could be more or less permanently confined in semi-permanent enclosures being constructed east of the Rhine, and guarded thereafter by other than combat troops.

This illusion was rudely shattered for a brief period by the receipt of orders that the division would be prepared to receive prisoners of war in large numbers from central enclosures in France, for discharge processing and transporation to their homes. The division seemed destined to remain in the prisoner of war business for an indefinite time in the future. It was recommended that discharge processing should be completed in the enclosures in France, and dischargees shipped directly by rail therefrom to Third, Seventh, and Ninth Army reception centers for local distribution by army agencies. The division would accept responsibility for local delivery in the area of the Fifteenth United States Army, which comprised roughly the division's Red, White and Blue areas.

The question was never completely adjusted. As early as 16 June 3,000 prisoners, not processed for discharge had been received from the west. During the next five days nearly 20,000 additional arrived from four different central enclosures. These arrived with inadequate advance notice, were of all categories, and were not segregated with respect to their place of residence. For a while it appeared that receipts from this source would exceed discharge output, with the net result that the prisoner population would climb again, after weeks of steady and encouraging decline.

It was the darkness which precedes the dawn. On 12 June the British took over 180,000 prisoners of war in the division's Red area, and the 3d Infantry was moved east of the Rhine, preparatory to taking over four semi-permanent enclosures there on 25 June. Before shipments thereto in appreciable numbers could be started the 3d Infantry was relieved from attachment to the division, and passed to control of the Seventh United States Army on 23 June. All provisional guard battalions were relieved from attachment to the division. The Fifteenth United States Army assumed responsibility for prisoners of war on 23 June (except in the Green area) and the division, on that date ceased to function under Comz. On 10 July the French assumed responsibility for prisoners of war, by now reduced to a total of 170,000 in the area of the Fifteenth United States Army. On this date, the division, with its reconstituted units from Mayen, trained and efficient, moved to the vicinity of Karlsruhe for occupational duty. The division artillery continued to administer prisoners of war until relieved by troops of the Seventh United States Army on 24 July, three months to the day after the prodigious job was undertaken by the division.

We are beginning to realize that no matter how a war starts, it ends in the mud. It has to be slugged out—there are no trick solutions or cheap shortcuts.

General Joseph W. Stilwell

Operation "Dragoon"—The Breakthrough

BRIGADIER GENERAL REUBEN E. JENKINS

This article supplements the article "Operation 'Dragoon'—Planning and Landing Phase" which appeared in the August 1946 issue of the MILITARY REVIEW—THE EDITOR.

The Assault

THE beaches of Southern France were well protected by land and underwater obstacles, automatic weapons and guns of heavier caliber, and a network of trenches. Because of the preparatory fires deemed necessary to breach the defenses, a daylight assault was decided upon. Coordination between naval fire support, air support and the airborne assault which was to strike at dawn was worked out with the greatest care. Closest coordination was effected to insure that the bombers were able to reach their prescribed targets without danger from naval fire support. And finally, the greatest care had been taken in coordinating the support fires with the beach assault. The naval and aerial bombardment opened at the appointed hour.

Before daylight, 15 August, the First Special Service Force landed on two islands (see Map No. 1) west of the convoy anchorage to silence heavy guns. It was successful. French Commandos landed at Cap Negre to silence guns there.

At 0422B hours the air at Le Muy and west of St. Tropez was filled with C-47's and parachutes. Gliders followed. The airborne division hit the ground fighting, despite an elaborate system of anti-parachute and anti-glider devices. The assault caught the Germans flat-footed, and they offered little organized resistance. The drop west of St. Tropez was not according to plan, but it proved of great assistance.

Promptly at 0800B hours the assault waves of VI Corps, about 12,000 men, hit the beaches through a maze of blown underwater obstacles. The Germans were wholly unprepared. Strong resistance, which was soon overrun by the 36th Division, was met only near St. Raphael. Casualties were surprisingly light and movement inland was rapid. An unusual measure of surprise was manifest at all beaches. Large groups of startled Germans were captured as their defenses and bivouacs were overrun. The Germans were given no time to recover from the impact. The VI Corps, with divisions abreast, plunged its assault waves headlong from the small beachheads without waiting for the desired support to arrive ashore and without further coordination. Exploitation was initiated from the beachline. This was a dangerous risk, and one requiring moral courage to accept. True, surprise was evident locally—but the *mission* was to *secure* a beachhead large enough to accept the initial 152,000 men. If the "estimate" that confusion existed in the rear areas proved wrong, one or more of the assault divisions might be knocked back into the water by dark, which was a long way off. Terrain favored the Germans—perfect observation over every beach, ideal first for blocking and then for use as a base for a powerhouse offensive rolling down hill to the waterline. "Time" and "terrain" were the dominant factors, and by all experience they should now be working for the Germans. By prompt and bold decision, General Truscott converted both to his own advantage before the Germans could react. A cautious commander, after a mental review of the *mission* might have "missed the boat."

The spearheads ploughed through and literally swamped elements of two divisions expected to defend the area. The Luftwaffe made weak attempts to attack the ships and the troops on the beaches. It was met with a hail of ack-ack and by alert fighters. Before they were driven off, the German planes burned one LST, but their sortie was too costly for them to repeat.

Contact with the airborne division was soon established, and confusion in the German rear was revealed. A part of the airborne division had landed on the headquarters of the LXII German Reserve Corps con-

trolling the area. Although the corps commander and his staff had avoided capture temporarily, the headquarters was now wholly ineffective. To total surprise, the German division had the added disaster of having no directing head to coordinate their actions and bring order out of chaos. The full measure of the disaster was revealed three days later when a cavalry reconnaissance detachment captured the missing commander. He said substantially: "We knew when you sailed, and observed your convoys as late as 14 August. You were expected to attack Genoa. I was told by the high command on the 14th that you would attack Genoa on the 15th. I was moving forces to the west to meet the landing near Marseille."

By dark of D-day, the spearheads were fifteen miles from the beaches on the left, eight miles from the beaches in the center, and five miles from the beaches on the right, where some delay had been occasioned by resistance near St. Raphael. The airborne division extended the area between the right and center ten miles. The bulk of the corps was ashore, except the Combat Command of 1DB which came ashore that night.

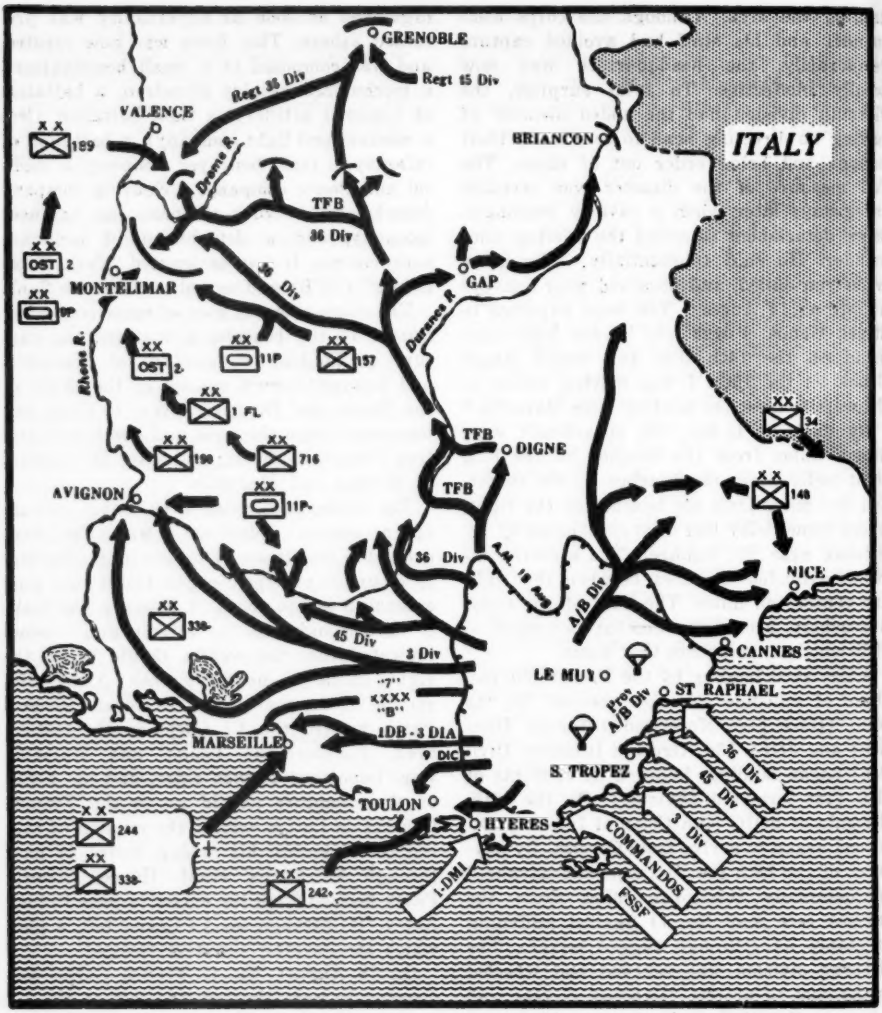
A dry-shod landing by the French one day ahead of schedule was now assured. On the 16th, 1DMI [1st Motorized Infantry Division] and 3DIA [3d Algerian Infantry Division] began landing, followed by elements of 1DB [1st Armored Division]. On the 17th, elements of 9DIC [9th Colonial Infantry Division] began to arrive from Corsica. By daybreak of the 18th the VI Corps had advanced approximately thirty-five miles from the beaches (see Map No. 1) against stiffening resistance and through rugged terrain. The airborne division was relieved and wheeled to the east to protect "Dragoon's" rear and drive on the Italian frontier to block the passes through the Alps. The British Airborne Brigade was withdrawn from the division for return to Italy, and First Special Service Force was assigned as its replacement.

During the planning at Naples, VI Corps had directed that a mobile armored group—other than the Combat Command of 1DB—be organized as soon as opportunity was presented ashore. This force was now created, and was composed of a small headquarters, a mechanized cavalry squadron, a battalion of armored artillery, a tank battalion (less a medium and light company), a battalion of infantry, a tank destroyer company, a medical ambulance company, a clearing company detachment, a truck company, an engineer company, and a detachment of ordnance maintenance. It was designated "Task Force Butler" (TFB) and moved to the north flank.

The original Army plan of maneuver, after seizure of the beachhead, involved the capture of Toulon, the capture of Marseille, and seizure of high ground in the angle of the Rhone and Durance Rivers to block any movement from the west and north and protect "Dragoon" during and after the capture of Toulon and Marseille.

The immediate vital area, after seizure of a secure lodgement, was the high ground in the Rhone—Durance angle. Failure to secure it promptly might result in a long campaign in the south of France. The tasks to be accomplished, the terrain and roadnet indicated that the weight should be on the right initially; hence, French Army "B" should be on that flank. However, General Patch wanted the VI Corps in the critical area. Furthermore, Toulon and Marseille were important French cities, and the honor of their capture should go to the French. General de Lattre wanted the mission of taking them despite his strong desire to pass through VI Corps' right. Hence, General Patch decided from the outset to pass French Army "B" through the VI Corps' left, a plan which the existing situation favored.

On 18 August, the II French Corps was directed to pass through the left of the VI Corps to capture Toulon. Instead of limiting a major effort to Toulon, the II Corps (French) directed 1DMI against Toulon, the bulk of 3DIA and 1DB against Marseille, and the portion of 9DIC now ashore through the gap behind 3DIA to invest northern and western Toulon. French strength in numbers alone did not justify the decision to divide the forces almost equally in the face of un-



Map No. 1.

known strength. They relied upon the morale and courage of their well-trained troops, and had the courage to exploit the element of surprise. The maneuver probably was not anticipated in view of the original plan, but General Patch gave it hearty support.

The VI Corps was on the Durance with its right by dark of 19 August, where it seized a crossing. The advance was being hampered by blown bridges, narrow winding roads and mountainous terrain. French Forces of the Interior (FFI) (guerrillas) stated that troops could advance towards Grenoble without much resistance, and offered to show the

way. Task Force Butler (TFB) was ordered to move on Grenoble at daylight 20 August. It met scattered resistance. The VI Corps continued west, swinging the center and left so as to face north as it cleaned up the Rhone—Durance angle. Reconnaissance revealed that masses of Germans were fleeing up the Rhone Valley and that a German column was moving south from Grenoble.

Montelimar

Before dark 20 August, TFB was ordered to turn west at daylight of the 21st and block all escape routes at Montelimar. This was an important decision and a tremendous risk. TFB would have to leave many detachments blocking roads and passes en route. Strong reinforcements would be necessary to do the job, if TFB succeeded in reaching Montelimar—and sufficient trucks to move them in a single shuttle were not available. Hence, all units employed in the encirclement were in danger of being destroyed piecemeal as they arrived in the battle area. But, unless this risk were accepted, the Germans in the Rhone Valley would escape. The decision gambled the survival of piecemealed forces against the survival of superior numbers fleeing up the valley. The decision was sustained by astounding results.

Operations against Toulon and Marseille required VI Corps to release the elements of 1DB to the French. Immediately after directing TFB to turn west, VI Corps assembled all available motors for the 36th Division, which it ordered to join TFB by shuttle.

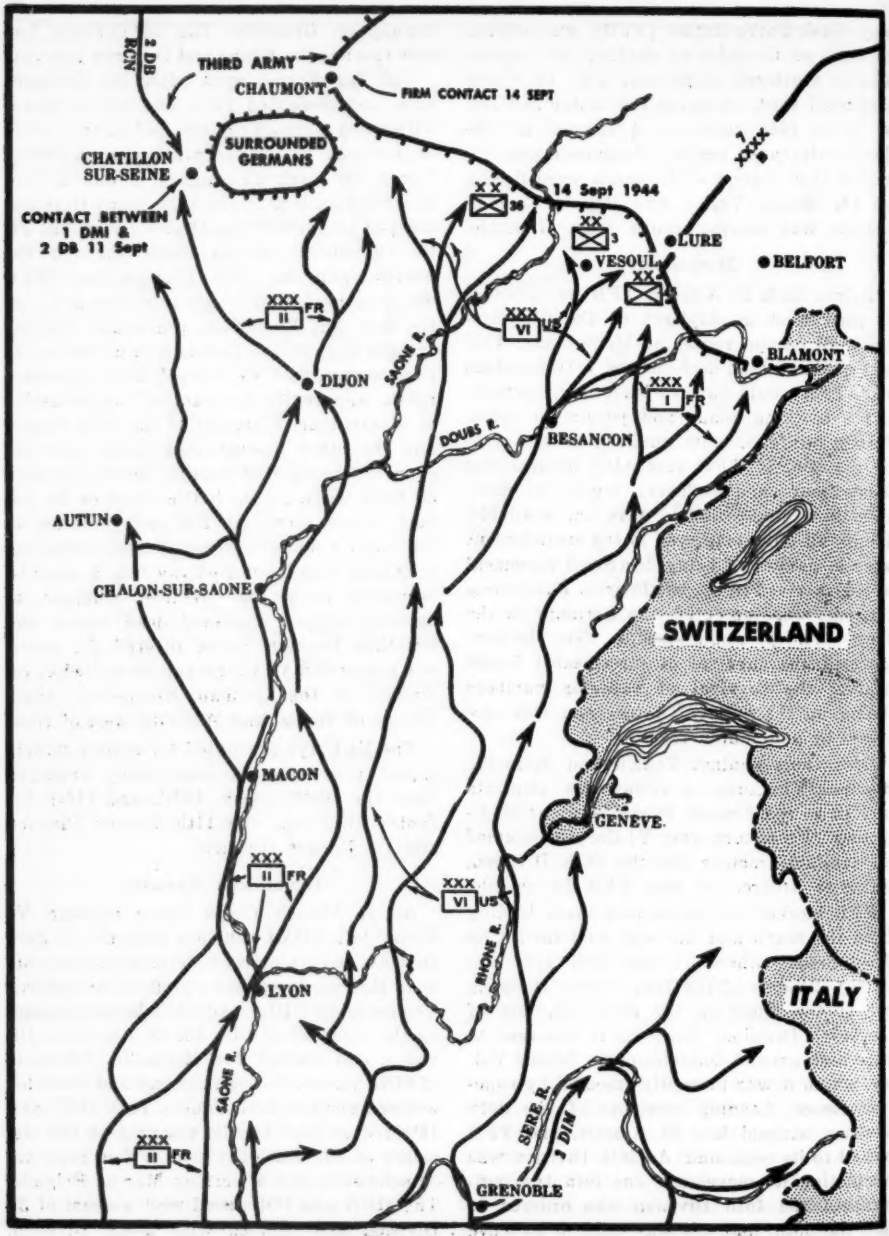
TFB blocked all passes and roads leading from the north and the east, and turned on Montelimar, where it ran full tilt into strong elements of the 11th Panzer Division, one of the finest on the continent, and of the 157th Division. However, it managed to seize high ground dominating the Rhone Valley, where it was promptly engaged by superior forces. Leading elements of the 36th Division arrived late 21 August, and TFB passed to its command. As 36th Division was completing its movement, one infantry regiment of the 45th Division was ordered to join the 36th, and one was ordered to move rapidly on Grenoble. The 3d Division had now reached the Rhone and Durance junction.

The Air Forces went after the Germans with unprecedented fury, and played havoc with many German columns before they could be brought to bear against the encircling forces. By dark 22 August it was a full-blown battle, lasting six days. Many Germans escaped by fording the Drome River, but little equipment filtered north through the narrow gap, as 36th Division and TFB would be hurled back only to return and stop the flow. The Rhone was unfordable, and its bridges were blown. Germans from the south, pressed by the VI Corps' left, streamed north, apparently ignorant of the situation at Montelimar. Elements of the 11th Panzer and the other disorganized units were not equal to the task of holding the 3d Division off their heels. As the battle ended on 28 August, there stretched for twenty miles to the south a mass of wreckage surpassing description. The main highway was a mass of destroyed guns and vehicles bumper to bumper. Several thousand dead horses and countless German bodies littered the route. Air power and VI Corps had ruined what remained of the German Nineteenth Army outside of Toulon and Marseille west of Nice.

The VI Corps accounted for approximately 23,000 prisoners—the bulk being captured from the 198th, 338th, 157th and 716th Infantry Divisions, the 11th Panzer Division and 1st Flieger Division.

Toulon and Marseille

As II French Corps drove through VI Corps' left, 1DMI ran into elements of 242d Division and strong coast defense detachments near Hyeres. It opened its offensive towards Toulon while 3DIA and 1DB broke through on the right along with the 3d American Division and dashed for Marseille. Elements of 9DIC passed through the gap and encircled western and northern Toulon. Both 9DIC and 1DMI were soon heavily engaged by the elements of the 242d Division, a few separate detachments, and a German Marine Brigade. The 3DIA and 1DB raced west abreast of 3d Division and collided with 244th Division,


2 DB RCN
THIRD ARMY
CHAUMONT
FIRM CONTACT 14 SEPT
SURROUNDED GERMANS
CHATILLON SUR-SEINE
CONTACT BETWEEN 1 DMI & 2 DB 11 Sept
14 Sept 1944
XX 36
XX 3
XX 2
XXX VI US
XXX II FR
XXX I FR
XXX II FR
XXX VI US
XXX II FR
1 XXXX
LURE
VESOUL
BELFORT
BLAMONT
DIJON
SAONE R.
DOUBS R.
BESANCON
AUTUN
CHALON-SUR-SAONE
SWITZERLAND
MACON
GENEVE
LYON
RHONE R.
SAONE R.
SERE R.
3 DIM
GRENOBLE
ITALY

Map No. 2.

elements of 338th Division and a few separate units east of Marseille. The French swung slightly northwest past the German flank and promptly invested the city.

The Germans encircled in Toulon and Marseille fought with fanaticism. These ports contained many defense guns of heavy caliber, still undamaged. In the hills around the cities were numerous guns in concrete emplacements. The task was not an easy one. The Air Forces, battleships, cruisers and destroyers rendered assistance. The naval guns and bombers soon reduced the principal gun defenses to rubble. Thereafter, it was a house to house fight in both cities until the Germans were subdued. The eastern section of Toulon fell on 24 August but Germans in the western section fought bitterly until 28 August, when 9DIC broke through and completely overran the defenses. It was a coincidence, and a credit to General de Lattre's judgment in thus dividing his forces, that Marseille also fell on 28 August. The French accounted for 34,800 prisoners.

"Overlord" and "Dragoon" Close the Trap

The Seventh Army now made a supreme effort to get behind the Germans facing the Third Army, which was now south of Paris, moving east. Unfortunately, logistics, and not Germans, was the most formidable opponent, although the Germans continued to fight desperate delaying actions. Up to now "Dragoon" had been relatively mobile, despite a shortage of trucks for tactical movements. But, with the bulk of its trucks yet to arrive and with unit transport now engaged in hauling supplies on a 600-mile turnaround which was being lengthened daily, the rate of advance was reduced to approximately the mobility of the foot soldier.

The VI Corps was directed to move northeast (see Map No. 2). French Army "B" was directed to place a corps of two divisions west of the Rhone rapidly, to advance abreast of VI Corps, and to move the remainder to the right of VI Corps, relieving VI Corps elements in the Alps north of the airborne division. All bridges over the Rhone had been destroyed. Nevertheless, the II French Corps (1DMI and 1DB) crossed the Rhone by ponton and ferry and was almost abreast of VI Corps by 31 August, while 2DIM, which was now ashore, was moving to the Alps north of the Airborne Division.

On 3 September the II French Corps entered Lyon and drove north in an effort to gain contact with the Third Army. The VI Corps moved northeast in a supreme effort to block Belfort Gap. Both Corps were now meeting much stronger and better organized resistance from new German units and the hastily reorganized remnants of the 19th Army. Hundreds of prisoners were still being taken.

On 10 September the II French Corps captured Dijon while units of the VI Corps captured Besançon. The remainder of French Army "B" was moving up on the right of the VI Corps, sealing the Alps as far north as junction of the French-Swiss-Italian frontiers and preparing to participate in any battle to breach the Belfort Gap.

On 11 September elements of 1DMI made spotty contact northwest of Dijon with the 2d French Armored Division, which had been moved to England from North Africa and had now joined the XV Corps of Third Army. On 14 September firm contact was established with the Third Army near Chaumont, which pinched out the II French Corps. General Patch ordered the II French Corps to complete mopping up the area and then cross the rear of VI Corps to the remainder of French Army "B."

The junction between "Overlord" and "Dragoon" cut off many thousands of Germans in southwest France. For example, one column of approximately 20,000 was moving east near Orleans, many miles to the west, when the gap was closed. The commander of this column halted his command and surrendered a few days later to the 83d American Division. The Germans in the Bordeaux and La Rochelle areas were rapidly surrounded by FFI units, those around Bordeaux withdrawing to Pte. de Grave and Royan.

The airborne division had practically de-

stroyed the 148th Division and was deployed along the Franco-Italian border, effectively sealing all passes for a distance of sixty-five miles, while 2DIM sealed the remaining passes to the north.

Results

On 14 September we find completed in one month more than had been optimistically estimated would require no less than three. The mission of "Dragoon" had been accomplished. French Army "B" had captured 47,717 prisoners, while the American Seventh Army had captured 32,211, for a total of almost 80,000 Germans. The German dead ran into the thousands, while no estimate of wounded is offered. The captured and destroyed German equipment was countless.

French casualties were 1,146 killed, captured and missing, and 4,346 wounded. The Seventh Army had suffered 3,000 Americans killed, captured and missing, and 4,419 wounded. No operation in our history has produced more decisive, dramatic, swift and far-reaching results at so little cost.

As a "secondary attack," "Dragoon" had achieved unsurpassed success. The stage was now set for a new phase of operations in Europe.

The Infantryman on the battlefield is distinctly on his own, without a horse or a motor to turn to, and lacking the anchor of a field gun or tank, or other heavy equipment. Once the field of action has been reached and the deployment completed, the infantry soldier becomes an isolated individualist, with all the frailties of the individual magnified a thousandfold. Only a corporal remains nearby to back him up, upon whom he can depend for reassurance. He lacks a physical rallying point—no ship, no heavy gun, no fortification, nothing but a few scattered buddies. He is a young fellow, depressed by a heavy physical burden on his back, exhausted by long marches of concentration and deployment, and lack of food, and he is virtually alone under the terrific pounding of hostile fires of every character. Of himself, by himself, he can apparently do little, though collectively he can win the war.

General of the Army George C. Marshall

Artillery with the Corps

COLONEL WINFRED C. GREEN, *Field Artillery*

Introduction

THE teachings at our Service Schools, and their publications, have, in general, covered this subject, but these have not been universally followed. There are various reasons for this. First, and most important, the Field Artillery School at Fort Sill, has concerned itself primarily, up to a short time ago, with the technique of artillery on the battalion level. Its technical doctrine has always been sound and often brilliant. It has given the American field artillery battalion a technical competence exceeding that of any other army. Tactics, when considered at Fort Sill, has also seemed to emphasize the battalion level and to confine itself generally to the reconnaissance, selection and occupation of artillery positions. At division level, most division artilleries have trained with great success and worked out their own tactical procedures for the employment of their organic artillery. This training has more than proved its worth in the conflict in western Europe. Corps artillery brigades, regiments, and groups as separate units also did their training in the United States on a generally sound basis, but neither at Fort Sill, nor in other training in the United States, has the problem of the tactical handling of the artillery with the corps—that is to say the division artilleries, the corps artillery and the various other artillery adjuncts—TD (Tank Destroyer) and AAA (Antiaircraft Artillery) units—been universally practiced or considered on the corps level.

Second, our early combat experiences before the opening of the campaign in Normandy did not give us any good idea of the scope of this problem. As a result, before D-day, little was done to perfect the technique of handling the artillery with the corps, except the writing of voluminous SOPs and holding several rather unsatisfactory field problems in which division and corps artillery units did some firing together on English artillery ranges.

British Methods

It might be well here to consider British methods. The British had had, unlike ourselves, much experience in handling of field artillery on a corps level prior to D-day. In their campaigns in France in 1940 and particularly in the Western Desert, they had evolved what proved to be a practical method of handling their artillery. Under the British system the artillery with each corps consisted generally of the division artillery of three light regiments per division (armored divisions having only two light regiments) and an AGRA (Army Group Royal Artillery) of one light regiment, three medium regiments and one heavy regiment. The AGRA and each of the division artilleries were commanded by brigadiers. All of them were commanded by a CCRA (Corps Commander Royal Artillery) who also served as the special advisor on artillery matters to the corps commander. The CCRA had a small staff to assist him, a survey regiment in charge of sound and flash ranging and survey, and a counterbattery section that generally worked semi-independently at the headquarters of the AGRA commander, or one of the division artillery commanders. While the CRAs (Division Artilleries) were responsible to their division commanders, the CCRA under the British system kept a good deal of control over them and, in fact, was prepared to order them to use their artillery in accordance with the wishes of the corps commander without recourse to their division commanders. In a real sense, then, the CCRA commanded the artillery with his corps. In the British Artillery School at Larkhill, prior to D-day, a whole series of problems was held to drive home proper methods of exercising this control to the maximum. It should be added that all non-divisional artillery under the British system was army artillery attached to the corps concerned, and the army artillery officer (BRA) could in theory move AGRAs as he saw fit. In practice, however, it seems reasonable to suppose his

control was not meant to be exercised tactically to the extent of that of the CCRAs.

Organization of Our Artillery

The organization of our artillery for the invasion in general resembled that of the British with some significant differences. Our divisional artillery included an organic medium battalion which the British did not have (with the exception of our armored divisions who had no medium organic battalion). Like the British corps each of our corps had attached to it a certain number of Army artillery battalions as corps artillery. In general this consisted of four 155-mm howitzer battalions, two 155-mm gun battalions, one self-propelled 155-mm gun battalion, one 8-inch howitzer battalion, one 4.5-inch gun battalion and two 105-mm howitzer battalions, one of them armored. The armored 105-mm howitzer battalion was almost universally attached in practice to an armored division and became all but organic. In each corps there were, according to some accounts, originally planned to be two groups to control this corps artillery, one for the mediums, one for the heavies. Just before the invasion this was changed to three groups. This was in contrast to the British system of one AGRA per corps.

Principles Governing Tactical use of Artillery

It may be well, also, to consider certain general principles in the tactical use of artillery. First, in a landing operation, a breakthrough or pursuit operations, artillery cannot be handled effectively on a corps basis or even a division basis. Under these conditions the artillery must be decentralized. Most of corps artillery should merely follow along in readiness to go into position when needed and the same applied to the medium battalion of the division artillery. Second, as soon as the situation crystalizes, control must be centralized in the highest headquarters capable of massing the fires. In most cases this has been, or should have been, the corps in this theater, but it has even been the army in certain cases. Third, no centralization of artillery control at any level should take away initiative of subordinate commanders necessary for the speedy delivery of fire in sufficient volume where needed.

The corps should generally be the tactical unit for the handling of artillery in any fixed or semi-fixed situation whether in the attack or defense, because most attacks are corps attacks, and most defenses are planned on at least a corps level. Infantry forces, antiaircraft, antitank measures and ammunition supply are all coordinated by the corps; artillery should be in a similar position. To take some examples, in an attack by more than one division it is necessary to make sure that the preparation fires of the division artilleries and those of the corps artillery cover enemy positions so as to accomplish what the corps commander desires. All artillery in the corps must be so disposed as to accomplish this object. The corps artillery commander, as advisor to the corps commander and responsible to him, is in a position to see that his desires are carried out and not over-ridden by the objectives of a lower level of command. In defense the same thing is true. Plans of defense on a corps level must be coordinated by the corps artillery commander and cannot be satisfactorily delegated by him to subordinate commanders. Plans for interdiction and harassing fires fall into the same category. It is more than possible that each division in a corps zone planning its harassing and interdiction schedule may leave some areas not properly covered by fire, and important supply routes undisturbed if their importance is not apparent to the division. Each division may also follow a harassing and interdiction policy so different from its neighboring divisions as to render such fires largely useless. As an example, some divisions use TOTs (time on target) on enemy installations as interdictions; others use continuous rate on road junctions; others use scattered harassing rounds at various times. Counterbattery fire must also be handled on the same corps basis with such liaison between adjacent corps counterbattery units to assure that there is no loss of effective fire or wasteful duplication on

enemy targets. One important reason for the necessity of this is the German practice of enfilading fire or cross-corps fire whenever possible. It is also necesssary to make full use of auxiliary artillery weapons, the AAA units and the TDs for indirect harassing missions. The cheapest ammunition for harassing is provided by 90-mm AAA and TDs. This saves more valuable medium and heavy ammunition for other targets.

This coordination cannot be accomplished without some degree of control. The corps artillery commander must be indoctrinated with the idea that all the artillery with the corps can be used by him. He must consider and give his approval, whenever possible, to all divisional attack and defense plans and plans for interdiction and harassing fire. He must control and direct the counterbattery section through his CBO (Counterbattery Officer) and all information, sound and flash locations, air OP reports, shell-reps must go to his CBO to be evaluated and acted upon most efficiently.

The same thing is true of observation, both ground and air. Observation posts must be coordinated within the corps zone by alloting zones of observation to corps artillery groups, coordinating them with division artillery. Air observation posts must be coordinated similarly. Without such coordination, OPs are duplicated in one zone and are all but non-existent in others. Without some air OP supervision the air becomes crowded. Two planes covering a certain sector at one time are more than adequate. Uncontrolled, this number may at times rise to nine or ten. Allotment of position areas for artillery comes under similar conditions. Without it, over-crowding and conflicts between divisional and corps artillery units often will result. Ammunition supply, survey control and metro corrections are also corps functions that must be controlled and disseminated on that level.

Method of Coordination

The method of exercising this coordination and control must differ naturally with the individual corps artillery commander concerned. Frequent visits to the units of the corps are essential. But the British have found that a corps artillery commander's conference with all division artillery commanders of the corps, the CBO and the AGRA commander gathered together is a fruitful method. It deserves consideration as a workable system. As long as the coordination and control are actually exercised with division artillery commanders and group commanders present to bring forward their points of view the situation can be well handled.

In the operations in Europe, it was found that divisions were often among the least enthusiastic exponents of such a pattern of artillery control on a corps level. While the corps should have been the command level in artillery it has been the division which all too frequently has been the highest tactical unit controlling the fire of American artillery. Except for counterbattery, which has been on the whole a well run corps function, corps has often commanded not the artillery with the corps, but only the corps artillery. And even here the practice of attaching a good proportion of the corps artillery to divisions has meant that even this artillery is lost to corps control. While divisions have often been overloaded with additional corps artillery battalions, the reverse process has gone on with the groups. These headquarters capable of handling from three to six battalions on the same basis as the British AGRA have been used sparingly. This procedure has a tendency to waste the capabilities of the groups and ignore their tactical functions. Corps artillery has tended often to become a brigade or super-group that fails to exercise its function in regard to the division artillery and performs the functions in regard to the corps artillery, for which groups were organized.

Control and coordination at corps level should exist mainly in the planning stage. No rigid centralization of the artillery with the corps is advocated in this article and corps control and coordination should not preclude a maximum of initiative on the part of the lower artillery headquarters.

Corps artillery headquarters should feel no hesitation in directing fire from division artillery or corps groups on targets on which the maximum volume of fire is worth while, but division artilleries must still have full freedom to fire in support of their infantry within their division zone without recourse to higher headquarters for clearance.

Assignments of Battalions to Groups

The battalions assigned to a group should be varied in caliber. A good combination of battalions would be one of each 105-mm howitzer, 4.5-inch or 155-mm gun, 8-inch howitzer and two 155-mm howitzer. All groups should have at least three battalions assigned; any less is a waste of overhead. Two and not three groups in corps can be used efficiently and they should have organic battalion assignments, not a hodgepodge of new and unfamiliar battalions. Flexibility should not degenerate into anarchy.

Groups should normally be placed in general support of the corps reinforcing the fires of a division with their battalions reinforcing the fires of the direct support battalions of the division. In that way, calls for fires from the observer with the infantry can come speedily and directly to the necessary corps artillery battalion and fire can be rapidly massed on corps order by both groups and divisions on important targets. Permission should not be necessary from higher headquarters to fire on targets when speed is important. The wire net from group to corps artillery battalion division direct-support battalion serves as a valuable alternate fire control line for both corps and division.

Ground and air OPs of both division and corps artillery should also have wide range and latitude in firing on targets of opportunity, without taking time to get permission from higher headquarters. Unless fired on quickly, such targets vanish. A tie-in between corps and division battalions means the observer can call quickly without clearing for the kind of fire, light, medium, or heavy that suits his particular target. Corps artillery headquarters should have priority in calling for counterbattery fires, but such priority should not preclude fire missions coming to a battalion from its own and other sources.

Battalions of corps artillery should not be attached to divisions in anything but a fluid situation. They should be so organized that they can render effective and prompt support at the call of the division artillery headquarters and its direct support battalions, and still be available to the corps commander for his use through a clear command channel—the corps artillery headquarters and the groups supplying this channel.

More important even than the weapons, however, was the indomitable fighting spirit of the men of the Allied nations who wielded them. The courage and devotion to duty which they exhibited throughout the campaign, in the grim days of the Ardennes counteroffensive as well as in the excitement of the dash across France and later the advance into the midst of Germany, were unsurpassable. It was the spirit that had enabled them to withstand the shocks of Dunkirk and Pearl Harbor which brought us at the last to Lübeck, to Torgau, and to Berchtesgaden.

General of the Army Dwight D. Eisenhower

Operations Analysis

LAURISTON S. TAYLOR
Chief, Operational Research Sections, VIII Fighter Command, June-November 1943; Ninth Air Force, November 1943-June 1945; Continental Air Forces, June-October 1945.

Introduction

WHAT is Operations Analysis? I do not know of any precise definition and, in fact, find some virtue in not attempting to define it, since to do so would undoubtedly restrict its present almost unlimited flexibility. Perhaps it may be defined as the study and analysis by scientific method of any problem arising in the operation of an Air Force. In general, the problems are worked upon by men having a type of background and training not ordinarily found among military personnel. It has been my own policy, though not always that of other groups, not to undertake any study which could be adequately carried out by existing personnel and staff sections of the command. It has been a further policy to turn over to the normal staff sections, any continuing problems which they might be in a position to handle after perhaps a little indoctrination from our research men. In this way, we avoid encroaching upon the prerogatives of another staff section.

Origins

The idea of operational research in a military organization originated with the British. Just prior to the outbreak of open hostilities in Europe, the British recognized the necessity for bringing to bear every possible bit of scientific talent upon the problem of air defense of their island. Adopting the methods so long accepted by competitive industry they gathered together a small band of scientists to study the operational characteristics of their radar early warning networks, and the problems of anti-submarine warfare. The almost startling results achieved by this group led to the broad extension of their methods into all phases of RAF operations.

Because of the British success and of the even more extensive and important relationship between research and industry in the United States, the Army Air Forces set about in 1942 to develop a similar organization. This was planned to be predominantly civilian for numerous reasons of which the following are a few:

1. All the best scientists in the United States were tied up in high priority war research jobs and could not be attracted into the new work if they were to be restricted by commissions and Army rules, regulations, and red tape.

2. The possibility of resignation existed in case the work appeared to flop. (It might be remarked that this has not occurred.)

3. The absence of rank meant having all rank, with the result that the men could deal with anyone from the lowest ranking private up to the highest generals.

4. Absence of rank also eliminates "bucking," and the usual 201 file, which together so frequently prevent a good officer from "sticking his neck out." *"Necks out" is practically SOP in a good Operational Research Section.*

Operations Analysis Sections are activated and assigned to a command upon specific request of its Commanding General. The office in Washington then recruits and processes the personnel in accordance with the expressed desire of the requesting unit. Once the section has been assigned in the field, it severs all reporting ties with Headquarters, Army Air Forces except in the matters of pay, appointment, etc. The section then becomes the very personal property of its new Commanding Officer. In most cases the sections are set up as special staff sections reporting directly to the Commanding General or his Chief of Staff. This is a very important principle in the establishment of such sections, since their studies of necessity cut across the work of

all other sections and they must have unrestricted freedom in doing this. In all sections with which I am familiar, adequate directives have clearly established this position of Operational Research in the staff set-up.

At the close of the war there were about eighteen separate operational analysis sections, including some 140 civilians, about an equal number of officers and perhaps half that number of enlisted personnel. Numerous citations and awards have been given or recommended for their services performed, thus indicating recognition of the value of their work.

Operational Research in the Combat Theater

Organizationally, the Operational Research Section or Operations Analysis Section was assigned at Ninth Air Force level. However, prior experience in the Eighth Air Force had proved that the best work by such a section should be done at the lowest possible echelon at which all data pertaining to the particular problems could be assembled. In the Ninth Air Force this meant the Commands, and as a consequence, our personnel of some eighteen scientists were distributed according to the demands of the various commands, and the capabilities of our personnel. At the start this meant about eleven at the Bomber Command and six at the Fighter Command. Late in 1944 one and two men were attached to the staff of the 29th and 19th Tactical Air Commands, respectively. There were opportunities for many more investigations than were actually carried out, so our method was to concentrate on those which we felt would bear the quickest fruit in so far as combat operations were concerned.

Selection of Problems

The method of selection of problems and the working approach to them of course differed in detail from one command to another, depending upon local circumstances; however, certain fundamentals appeared to obtain in all commands. First, it was found that few of the problems are brought to the Operational Research Section directly by the command itself. At least three-fourths of the problems were discovered by the personnel of the analysis section. This is quite reasonable inasmuch as they know their own capabilities. Second, one of the basic reasons of bringing an Operational Reasearch Section into a command is because, in general, the command cannot "see the woods for the trees." This again is perfectly reasonable since in any endeavor the more familiar you become with a complex organization, the more difficult it is to discover any of its possible shortcomings. The general selection of a problem is influenced strongly by two major questions: (1) "Can a reliable answer be obtained within a reasonable length of time?" (2) "If an answer is obtained, will it be of significant value to an immediate Air Force operation?"

I will now deal with the work of the section attached to the IX Bomber Command. The Operational Research Section was attached to this Command as a special staff section and was composed entirely of civilians who, as one officer remarked, might be likened to "sheep in wolves clothing." Here the section dealt primarily with the more technical aspects of bomber operations where it seemed likely that the best analytical results could be obtained by people who have had considerable training in research methods. Furthermore, since the section was not set up as a part of the operations staff, it avoided, in general, any immediate day-to-day responsibility and hence could devote its full attention to detailed aspects of specific problems. Through this lack of responsibility for immediate operations, it is possible to give more careful attention to details which the command would otherwise be compelled to pass over quickly. As a matter of fact, it was frequently demonstrated that it was through a study of many correlated small details that we were able to arrive at really worthwhile conclusions regarding an overall phase of operations.

Composition of the Staff

The particular staff was made up largely of people who have actually worked on the

development of military weapons or at least had contact with some phase of military research. Without exception, these men were scientists, mathematicians, engineers or statisticians. Among the members were men who had worked on the development of proximity bomb fuzes, bomb ballistics, radar, dive bombsights, rockets, 20-mm airplane cannon, torpedoes, etc. Only occasionally (except for the radar men) would their immediate background of experience find direct application here but, nevertheless, this experience would find general application in almost any problem that arose.

As mentioned above, the section was set up as a separate staff section reporting to the Commanding General or Chief of Staff. This was to prevent its decisions from being unduly influenced or controlled by any individual section within the Command. On the other hand the general working policy has been to coordinate its work carefully with every section in the Command concerned with the particular problem. Our conclusions were presented independently, and their being put into effect resulted mainly from the clear and logical presentation of facts rather than from any sales promotion methods. In other words, the presentation of any problem was such that it would stand on its own feet and appeal to the reasonableness of the Command.

Nature of Problems

The problems worked on were varied although probably not so varied as in some other Commands—as for example, the VIII Bomber Command which had a very large section. The list of IX Bomber Command problems included the following:

Analysis of bombing accuracy.
Bomb damage.
Selection of bombs and fuzes.
Study of incendiary vs HE bombs.
Analysis of pathfinder blind bombing.
Radar countermeasures.
Change of formation techniques to minimize flak losses.
Selection methods for lead crews.
Scoring of pilots and bombardiers.
Aerial navigation.
Flexible gunnery.
Computation of bombing probabilities.
Determination of necessary weight of attack on specific targets.
Analysis of beachhead defenses to determine most effective method of attack.

Studies in the IX Tactical Air Command included the following:

Pre-invasion siting of all radar equipment.
Analysis of MEW radar reporting and fighter control in Normandy.
SCR-584 blind bombing.
Analysis of strafing and gun harmonization.
Setting up dive bombing tables.
Planning railroad interdiction program.
Operational use of, and training with, rockets.
Pre-invasion trials for radio interference.
Analysis of bridge attacks by fighter-bombers.

In all, some 200 reports and training manuals on these and related subjects were published during Ninth Air Force operations in the ETO.

Outline of Operational Research

In the question of bombing accuracy, strike photos for every individual aiming operation were analyzed. From them we determined the shape and dimensions of the bomb pattern with relation to the direction of attack. Out of this arose the question of how the formations were flying in order to produce such a bombing pattern, and corrective measures were introduced to change the formations in order to produce a greater degree of uniformity within the bombfall.

This also involved the degree of bombardier proficiency. At the outset of the operations there was only a limited number of adequately trained bombardiers who could lead bombing formations. So long as this condition existed it was preferable to maintain a bombing formation of eighteen planes with a consequent spreading of the bomb pattern in a somewhat wasteful manner in order to be assured of hitting the target at all. When we came to investigate the cause of poor bombing we found that one of the more

important factors was the continual mixing of bombardier-pilot combination in the lead ship. When this was called to their attention the groups concentrated on retaining lead crews as units. Improvement in bombing showed up almost immediately. Also, after the pool of bombardiers having a certain calculable degree of proficiency reached a certain size, it was found that a point had been reached where bombing by formations in sixes would result in an overall improvement. This was tried out and quickly demonstrated.

Another factor which was determined from the basic strike photos was the percentage of bombs which struck within a given distance —say 500 feet of the briefed aiming point. This, together with the radial error, and range and deflection error likewise measured, gave a concrete and tangible measure of the real operational effciency and the bombardiers skill, respectively. In studying these data, it became apparent that some bombardiers are habitually good and others habitually poor. This, in itself, was not surprising, but what was surprising was the fact that nothing was being done about it in a systematic manner. There was thus indicated the desirability of setting up some sort of a scoring system for a numerical rating of the bombardiers and lead crews. Such scoring was tried out privately in our own shop before being presented to the Command since it was recognized that any scoring system may be subject to abuse if carelessly used. From this, however, we were able to devise a system to aid in the selection of good lead crews. Furthermore, it was found to be possible, within reasonable limits, to predict upon the basis of four or five actual missions what the particular crew proficiency would be in the future. While organizational injustices might occasionally result, it was nevertheless possible to reduce materially the training load by weeding out probably poor material at an early stage. When these ideas were finally demonstrated to the groups their acceptance was prompt and enthusiastic, and the selection system was used voluntarily by all groups throughout the last year of their bomber operations.

From our knowledge of bombing accuracy together with the qualities of the bombfall patterns, it became possible to compute the effort required to assure the requisite number of hits in a target area. Since this depended upon many and variable factors such as crew proficiency, weather, flak, etc., the subject was kept under constant scrutiny, and requirements modified frequently to take account of existing conditions. In this connection, it was possible to change substantially the attack weights with the resultant economy in the employment of our available striking power.

This same study of bombing accuracy indicated a certain percentage of gross errors, such errors being defined as misses of over 2,000 feet. While the percentage of gross errors was never very large, it would, nevertheless, usually represent a total waste of bombing effort. Consequently, we sought the causes of such errors. Of course, many of these were found to be due to factors essentially outside the control of the bombardiers, being due to such things as enemy action, flak and weather. On the other hand, a certain number of them were plainly due to carelessness. The problem was to find out which were which and why. To accomplish this we had installed, in as many formations as possible, a special camera which took a photograph every four or five seconds for the three minutes prior to the bomb strike. Analysis of these photographs when arranged in a continuous mosaic exposed certain fundamental bad habits or errors of judgment—primarily in navigation. It also could show when a formation was thrown off course by flak or when improper bombsight adjustments had been made. Navigation appeared to be the predominate fault, and based largely on the analysis of a large number of these mosaics, it was possible to determine the more common causes of navigation difficulties and training deficiencies.

While it was true that practically all of the faults were those normally recognized, what had not been appreciated before was

the frequency of occurrence of these faults and their combinations of one another to produce a particular, bad bombing. Finding this material so clearly demonstrated beyond the question of a doubt, the Commanding General called a meeting of his Wing Commanders and laid the problem before them point by point. This resulted in a general tightening up of navigator-bombardier training requirements, improvement in briefing methods, changes in map reading procedures, placing of greater stress on G-fixes and their recording, etc. In all, a very substantial overhaul was made of the whole navigation procedure in the Command.

The ramifications of a study on bombing accuracy spread into all phases of the operations. There are numerous other things, that came out of this general line of study. During the period that our section worked with this Command, its bombing efficiency expressed in the percentage of bombs within a given distance of the target, and its bombing accuracy expressed in terms of radial error, each improved by the order of 300 per cent.

I have dealt with one phase of the work in the IX Bomber Command. The same problem in the Nth Command will be basically similar but will differ in essential details and its analysis may, and usually will, involve an entirely new set of variables. In short, you cannot write a "handbook of operational analysis." No more can you write a simple handbook of bombing formations, or bomb selection or radar interceptions and so on. These are all very complicated problems for which there is always a best answer. The answer, however, can only be found by close and critical research on the spot. The employment of operations analysis sections at command levels has gone a long way to filling this need.

The Future of Operations Analysis

As far as I am aware, operations analysis has paid its passage. In the late spring, General Eaker addressed personal letters to all the Commanders of units having Operations Analysis Sections asking their opinion as to the future of the division in a peacetime Air Force. Without exception, the replies recommended continuance of the work with the building up of a pool of experienced analysts. Most of the replies indicated that the leadership should be in the hands of civilian scientists with regular Air Force officers to provide the military tie-in and to assist in the dissemination of the results.

The difficulties are not all cleared up by any means. No positive policy has yet been set up by AAF and until this is done we are unable to hold or attract the calibre of scientific personnel essential to its operation. A number of top-notch men with extensive theater experience have expressed a keen interest in continuing with the work. While they are unwilling to commit themselves in the face of the uncertain policies on operations analysis, they are nevertheless working on several projects in Washington and at the AAF Board.

With the advent of even more complicated scientific warfare than we have ever known, I am personally convinced as to the necessity of maintaining a program of operations analysis not only for peacetime operations but to constitute a liquid reserve for instant action if another war should threaten us.

It is not enough for nations to declare they do not want to make war. Hitler said that. In a sense he meant it. He wanted the world to accept the domination of a totalitarian government under his direction. He wanted that without war if possible. He was determined to get it with war if necessary.

Hon. James F. Byrnes, Secretary of State

Development of Military Railway Service

MAJOR GEORGE E. LOURIE, *Transportation Corps*
Former Instructor, Command and Staff College

FROM the opening of the first full-fledged American railroad, thirteen miles in length, in May 1830 up to the present time, railroads have played an ever-increasing part in wars involving the United States. Even though railways were first built in 1830 in the United States, it was not until the Civil War that the employment of railways in warfare took place in this country. Railways had been used prior to this time for the prosecution of war in other countries, but not on a very extensive scale. In Europe in 1848 and 1849, the use of railroads in warfare first attracted public attention with the movement of a body of 13,000 Russian troops and forty-eight pieces or artillery. The movement would have required sixteen days if performed by the conventional marches of those days; however, by the use of the railways the trip was made in five days with a resulting saving of eleven days.

In the United States, the first time the railroads were employed to any extent in wartime was in the Civil War, when the most extensive use of them was by the Northern Forces. In Washington it was felt that railroads in a theater of operations must be under the absolute control of the military authorities, and by an Act of 31 January 1862, Congress authorized the President, whenever, in his judgment the public safety might require it, to take possession of any or all the railroad lines in the United States, their rolling stock, their offices, shops, buildings, and all their appendages and appurtenances. The railroads, then as now, cooperated fully and patriotically. Their presidents met in Washington and submitted a fair tariff schedule to the Government which was accepted and remained in effect throughout the Northern States until the end of the war. With such an arrangement it was never necessary for the President to apply his conscription powers in this matter.

While the above incident refers to absolute control of railway operations in a theater of operations, nevertheless, it is worthy to note the parallel in establishing control over commercial transportation in the United States during World War II when the Office of Defense Transportation (ODT) was established to provide "One-Man Control" over the domestic transportation facilities of the United States in order to gear the nation's transportation to the war effort.

During the Civil War, experience showed that it was necessary for professional railroad men to take charge of railway operations, and on 11 February 1862, the Secretary of War appointed Daniel Craig McCallum, General Superintendent of the Erie Railroad, "Military Director and Superintendent of Railroads in the United States," with extraordinary powers. His title was later changed to General Manager of all railways in the possession of the Federal Government, and McCallum became a Brigadier General to exercise these powers. In a sense this was the beginning of the Military Railway Service in the United States Army. It is rather interesting to note that the first so-called Military Railway Service comprised 18,000 men with 419 locomotives, 6,330 cars, and operated some 12,000 miles of railway within the territory of the two opposing forces.

However, it was not until World War I that the extensive development of railways in warfare took place in support of the Armies in Europe. An Engineer Commission to England and France, known also as the Military Railway Commission to those countries, was appointed somewhat less than a month after war had been declared by the United States against Germany. This marked the first active step taken by the War Department in recognition of the part that transportation in World War I was to play in support of our forces overseas. The purpose of the commission was not so much to plan for a transportation service of our own as it was to secure information relating to possible assistance

from this country in connection with the railway service of the Allies in France, as well as to secure information regarding engineer equipment, organization and training. It was interesting to note that the railway system in Europe in World War I was divided roughly into two types; namely, standard gauge and light railways (narrow gauge). The purpose of the standard gauge railways was to bring up supplies and troops from the ports to the railheads. From the railheads forward to the using troops a system of roads and light railways was employed. Since at the time of World War I, motor vehicles and road systems had not been extensively developed, highway transport alone could not carry the load, and it was necessary to augment it by means of light railways to supply the front line troops.. Experience in World War I led to the use of light railways for the movement of supplies and troops in a zone eight to sixteen miles in depth behind the front lines. The system of light railways was arranged generally in three approximately parallel lines in rear of the front within this zone. The first line in rear of the front was laid out to support the front line troops and light artillery, the second line was used for the supply of medium artillery, and the third line was used for the supply of long-range guns. From July 1917 until March 1918, the control of light railways was under the jurisdiction of the head of the Transportation Service. However, in March 1918 there was a reorganization in which light railways and roads were taken away from the Transportation Service and placed under a newly formed Service of Utilities, a part of Services of Supply. Light railways remained in this category until the end of hostilities. It should be noted that where the light railways furnished this link in transportation in World War I, this service was largely provided by highway transport in World War II.

Prior to World War I, our Army doctrine provided: (1) that rail transportation overseas in all of its phases, from the ports to the front (except port construction), should be handled under an officer of the Corps of Engineers, to be known as the Director of Railways, reporting directly to the Commander of the Line of Communications; (2) that the construction of other transportation facilities, such as roads, ports and railroads, should be the duty of the Corps of Engineers, likewise under the Section Commanders reporting to the Commander of the Line of Communications.

Under these regulations one unsatisfactory feature was the provision that in time of peace the Quartermaster Corps should attend to rail transportation, but that in time of actual or threatened hostilities this would be turned over to the Corps of Engineers in a theater of operations. As a result, the Quartermaster Corps was under no obligation to fit itself for the strenuous requirements of rail transportation in a theater of operations which were to be taken over by another arm of the Service. Somewhat similarly the Corps of Engineers was not given an opportunity, until hostilities threatened, of gaining an education in peacetime for what would be expected of it in time of war. In the sequence of events, eight reorganizations of the Transportation Organization of American Expeditionary Forces (AEF) took place while actively engaged in World War I.

During the reorganization in the fall of 1917, the Commander of the AEF recommended to the War Department the creation of "rail transportation" as a separate department of Army Field Headquarters to be officered by "temporary officers of the National Army not qualified for purely military duties." Approval to this recommendation was given, and a Railroad Transportation Corps came into existence with Brigadier General W. W. Atterbury from the Pennsylvania Railroad as its head. In June 1918 the President further approved the establishment of a Transportation Corps in the National Army with a strength of 1,932 officers and 63,034 enlisted men. This strength was later, in early October 1918, increased to 6,000 officers and 200,000 enlisted men including stevedore forces numbering 75,000.

In the end, the transportation organiza-

tion as established was headed by a Director General of Transportation, reporting directly to the Commander in Chief of AEF. The Director General of Transportation had the following duties with respect to the Military Railway Service:

Operation, maintenance, and construction of all railways and canals under American control. Construction and maintenance of buildings for railway purposes.

Liaison with French authorities to insure prompt service for United States goods and troops in transit over railways operated by the French.

Compilation of all accounts due to the United States for material furnished the French railways.

Procurement of railway supplies.

Control of telephones and telegraphs for railway purposes.

Railway personnel.

Compilation of statistics showing classified tonnage received at ports, that which moved over railways, and that delivered at railheads.

Operation of terminals, including unloading of ships and transportation of goods to storehouses.

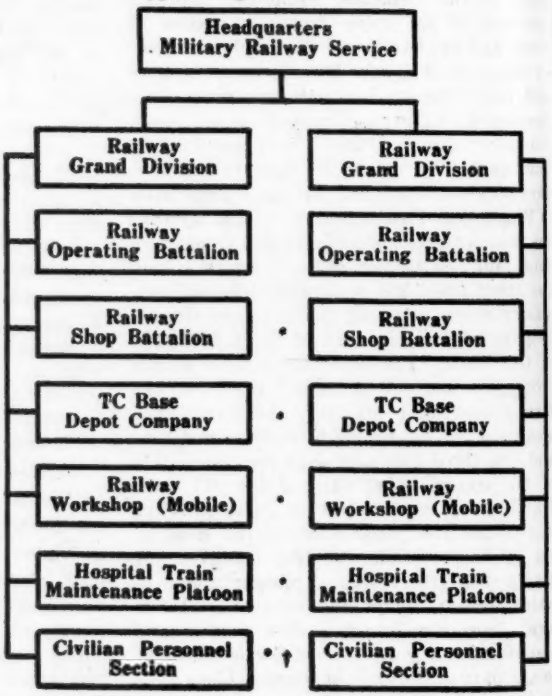
Control and maintenance of all rolling stock and motive power.

All construction would be under the Commanding General, Line of Communications until further orders.

During World War I the repeated changes in the organization of the Transportation Organization generally involved the question of responsibility for construction of roads and wharves, and of shops and other transportation facilities as between the head of the Transportation Service and the Corps of Engineers. It also involved the responsibility for transportation control from the ports to the using troops, and the policy of whether the head of the Transportation Organization was to report directly to the Commander in Chief or to a subordinate under him.

With the advent of peace, after World War I, it was unncessary to continue the wartime Military Railway Service (MRS). However, it was necessary to plan for future emergencies. The National Defense Act of 1916 and 1920 provided the authority for the establishment of the Officers' Reserve Corps, and here was a likely source of officers needed to establish reserve military railway units.

Typical Organization M. R. S.



*Number of units and type selected dependent upon situation. Where units are employed, they may be either assigned to Grand Divisions or retained under Hq. MRS.

† In view of World War II, experience, use of civilian personnel section is highly dsirable.

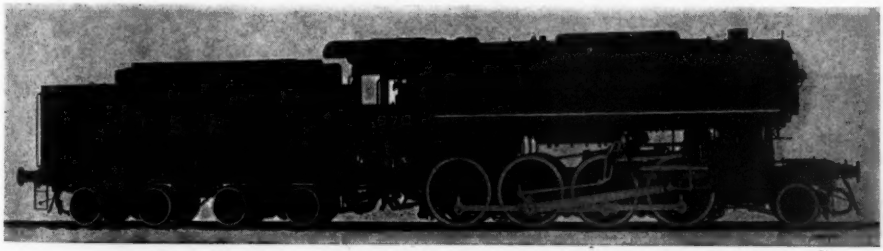
Figure 1

The Military Railway Service was under the Chief of Engineers, and organized by that headquarters. After a study of the lessons in France, in World War I, the railway operating battalion was established as the basic railway operating unit and thirty-two of these, known as affiliated reserve units, were formed on respective trunk line railroads of the United States. Officers were commissioned from among appropriate officials of the sponsoring railroads. In addition nine "Regular Army Inactive" battalions were also formed with the officer personnel coming from experienced railway reserve officers in the various Corps Areas. One railway shop battalion was formed by one of the large civilian railroads, and a grand division was also partially organized. Colonel (later Major General) Carl R. Gray, Jr., Operating Vice-President, Chicago, St. Paul, Minneapolis & Omaha Railway Company, was appointed Manager, Military Railway Service.

With peace again prevailing, the nation's interest in its military forces soon declined. Appropriations decreased with the result that the Army became scattered and tried to hold together what forces it could. Accordingly the railway units were left to shift largely for themselves, and in some cases, continued at near full strength due principally to the interest and energy of individuals. In other cases the units practically disintegrated. As war clouds began to appear in Europe, prior to World War II, the Chief of Engineers determined to revitalize the Military Railway Service. Colonel Charles D. Young, Vice-President, Pennsylvania Railroad, was given the mobilization assignment of Chief, Railway Section, Office Chief of Engineers, and the section was re-established as a separate unit. Aside from the unhealthy condition of some of the units of the MRS, the service as a whole was not a balanced force. Colonel Gray's staff was almost nonexistent. Besides, there were no grand divisions or immediate headquarters. There was only one shop battalion to do back-shop work for the forty-two railway operating battalions.

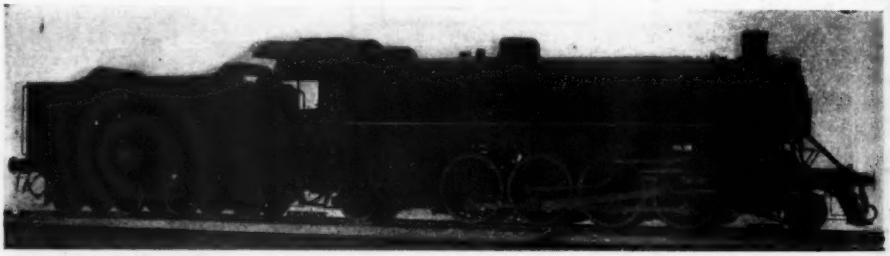
The first railway operating battalion was activated 18 June 1941, and instead of being sponsored by one railroad was made up of officers drawn from ten American railroads. To a limited extent railroad men who were in the enlisted reserve were contacted in an effort to obtain men with military and railroad training. However, most of the enlisted men came from train centers, and those with railroad training were especially sought after. In many cases men with no railroad experience were brought into the Military Railway Service and trained.

A railroad approximately fifty miles in length was actually constructed in Louisiana by the first activated railway operating battalion with the assistance of an engineer separate battalion. This railroad was later to serve as the training grounds for other battalions. As one military battalion was not sufficient to train the required number of railroad troops, and in order to provide



Consolidation Type 2-8-0, 4' 8½" Gauge, Weight 138 tons, wheel base 51' 7".
Figure 2.

additional training facilities, certain of the civilian railroads entered into contracts with the War Department to sponsor military railway units whereby soldier personnel worked side by side with the civilian railroad workers. Operating personnel or train crews would accompany a train manned by civilian crews to learn the operating rules, details of locomotive operations and railroad technique. This same policy was followed in regard to shop work where the soldier personnel worked side by side with the civilian workmen to learn maintenance and repair. Thus it was that a Military Railway Service was formed with experienced personnel of the civilian railroads as a nucleus. Thus we see how the Corps of Engineers in preparing for



MacArthur Type 2-8-2, 4′ 8½″ Gauge, Weight 165½ tons, wheel base 58′ 6″.
Figure 3.

World War II started the activation of the Military Railway Service. However, in the Army reorganization in 1942, a Transportation Corps was formed and War Department General Order No. 60, 16 November 1942, transferred the Military Railway Service to the newly-formed Transportation Corps. The Military Railway Service of World War II at its peak consisted of four headquarters MRS, eleven railway grand divisions, thirty-three railway operating battalions, and eleven shop battalions.

Let us now consider the Military Railway Service as it is today (see figure 1). As previously stated, the railway operating battalion is the basic unit of the railway service and the size of the Military Railway Service is made up of the required number of operating battalions together with the required number of associated units. A railway operating battalion is organized into four companies and contains sufficient, trained personnel to operate from ninety to 150 miles of single-track railroad. In civilian practice, railroads are made up of divisions under a division superintendent. The ninety to 150 miles constitute a division with the Commanding officer of the railway operating battalion acting as division superintendent. Within each operating battalion there is the necessary personnel in Headquarters and Headquarters Company for operating the division headquarters and performing train dispatching. Personnel is provided in the battalion for the maintenance of the track. The Transportation Company of the Operating Battalion ("C" Co.) can provide fifty train crews. For the maintenance of the equipment, the battalion has personnel trained in the light maintenance of motive power and rolling stock.

After the length of railroad trackage to be operated is determined, the required number of railway operating battalions can be estimated on the basis of the above capabilities.

Heavy repairs to motive power and rolling stock must be provided, and for this purpose railway shop battalions are designed on the basis of one railway shop battalion to each two or three railway operating battalions.

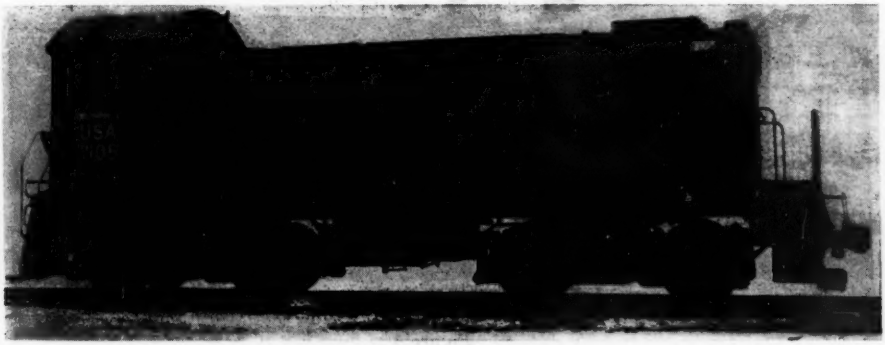
The next higher headquarters above the railway operating battalion is the railway grand division, and this will normally con-

trol the operations of two to six railway operating battalions and the necessary shop battalions to accomplish the heavy repairs.

To provide the necessary qualified personnel for the storage and issue of railroad supplies, a Transportation Corps base depot company may be employed and a railway work shop (mobile) may be used to provide repairs to equipment and erection of new equipment at ports away from shops operated by the railway shop battalion. There may be occasions when it is necessary to assign hospital train maintenance personnel to the Military Railway Service.

Where the operations of Military Railway Service are rather large, more than one railway grand division will probably be required, and in this case a Headquarters Military Railway Service will be established under a general manager. When railway operations are very extensive, containing more than one Military Railway Service, it will be directed by a Director General MRS. The Military Railway Service, together with its attached units and personnel, may be established as an exempted command responsible to the Transportation Officer, Communications Zone, except that the several Communications Zone Section Commanders will exercise administrative authority over the MRS units and attached personnel and units located within the geographical boundaries of their respective sections. The limits of the various divisions and grand divisions will be established by the headquarters Military Railway Service. In the organization of the MRS, there may be two methods used in the control of the shop battalions, base depot companies, railway workshops, (mobile), and hospital train maintenance units. These units may be placed directly under the general manager MRS for close control or they may be assigned to a grand division.

With the organization established, the equipment needed to operate may be divided into motive power, rolling stock, and special equipment. Motive power is a collective term comprising the locomotives whether they be steam, electric, Diesel or gasoline. Rolling stock collectively denotes all cars, including box, flat, gondola, tank, and special cars. Under special equipment may be grouped pile drivers, wreckers, and special track maintenance equipment.



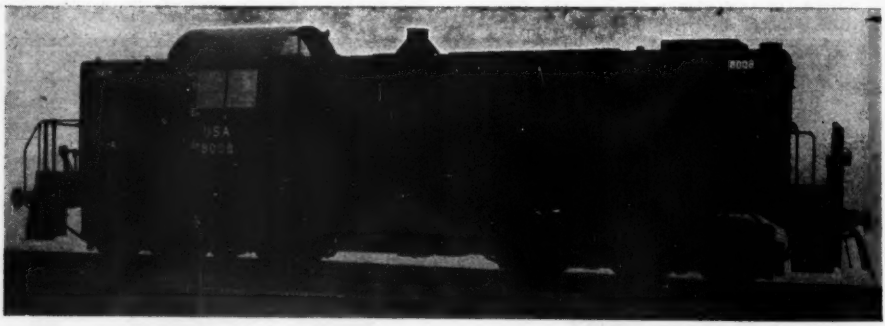
Diesel Locomotive 0-4-4-0, 1,000 H. P., 115 tons.

Figure 4.

Of the steam motive power procured by the Army for use in World War II in the Military Railway Service and used in main-line service, two types predominate; namely, the Consolidation (2-8-0) and MacArthur (2-8-2) types. The numerical type designation (2-8-0) for the Consolidation locomotive may be easily derived by reference to Figure 2. Starting at the right side of the figure (front of locomotive), it is noted that there

is a small pair of leading wheels; hence, the number "2." Then to the rear there are four pairs of driving wheels of larger diameter; hence, the number "8." Then since there are no wheels immediately in rear of the driving wheels, the next number is "0." Similarly, the numerical designation (2-8-2) is derived from the MacArthur type shown in Figure 3. The name "MacArthur" is a military term, and in commercial practice this type of locomotive is known as a "Mikado" type, due to the fact that this type of locomotive was first designed in 1897 to fill specifications for locomotives ordered by Japan from manufacturers in the United States. With regard to the types of Diesel locomotives used by the Military Railway Service, the principal types used are the 0-4-4-0 and 0-6-6-0 types. With reference to Figure 4, and starting at the right of the picture, it is noted that there are no leading wheels; hence, the number "0." Then to the rear there are two pairs of driving wheels; hence the number "4," and to the rear there are two more pairs of driving wheels to give the number "4." Since there are no trailing wheels in rear of the driving wheels, the last number is a "0." Similarly, the numerical designation 0-6-6-0 is derived for the Diesel shown in Figure 5.

Of the rolling stock of all gauges owned by the Army and used by the Military Railway Service, box cars accounted for forty-eight per cent, gondolas thirty-six per cent, flats seven per cent, cabooses and tank cars four per cent each, and refrigerators one per cent. An analysis of the standard gauge rolling stock reveals that: most of all the box cars where 4-wheels (2 axles), all cabooses were of 4-wheel (2 axles), all flats were of 8-wheels (4 axles), the majority of gondolas were of 4-wheels (2 axles), all refrigerators were of 8-wheels (4 axles), and all tank cars were of 8-wheels (4 axles). This breakdown of rolling stock is in line with the policy of having light equipment for operations over rough track and light bridges in the forward areas of a theater of operation. Also the use of light equipment facilitates the rerailment of derailed cars and the clearance of wrecks.



Diesel Locomotive 0-6-6-0, 1,000 H. P., 127 tons.

Figure 5.

The light maintenance of this equipment can be performed by the Maintenance of Equipment Company of the Railway Operating Battalion ("B" Co.), but when heavy repairs are required, then the Railway Shop Battalion must be employed. Light maintenance of equipment corresponds to that work done in roundhouses in civilian railroad practice, whereas heavy repairs correspond to those repairs performed by large railroad shops or back-shops in civilian practice.

In Military Railway Service it is normal practice to assign the motive power to the railroad division; thereby fixing maintenance responsibility. However, the cars

or rolling stock, are not so assigned, but are employed on the railroad at large, and the maintenance is accomplished by means of inspections by each division to detect unsafe conditions. These conditions are repaired by the respective division finding them unless they are of such magnitude that it is necessary to have the repairs performed by a shop battalion.

In the operations of the Military Railway Service overseas an attempt is made to utilize as much of the existing equipment as possible, and some equipment may be rehabilitated. Also civilian labor is employed wherever possible.

Another type of maintenance is maintenance of way, and each operating battalion includes a Maintenance of Way Company ("A" Co.), responsible for maintaining the track, bridges, buildings and structures located within its division. In the event that extensive repairs to buildings or new buildings are required, this will normally be performed by the Corps of Engineers. Likewise new track construction or extensive rehabilitation of track as a result of floods or bombings will usually be performed by the Corps of Engineers.

Normally the Director General, Military Railway Service, within the limits of strategic plans, will be responsible for selecting the main railway lines of communication subject to the concurrence of Army or Army Group Commanders and Theater Headquarters.

Even with the improvement and development of newer forms of transportation; such as, highway transport, air transport, and pipelines, the railroads still remain the backbone of the transportation system where available, and are characterized by their ability to move large volumes of men and supplies quickly and efficiently.

The United States of America and Great Britain have worked, not merely as allies, but as one nation, pooling their resources of men and material alike, in this struggle against the forces of evil engendered by Hitler's Germany. In the Expeditionary Forces which it has been my privilege to lead, both in the Mediterranean Theater and in Northwest Europe, an Allied experiment unprecedented in the history of the world has been carried out with decisive results.

General of the Army Dwight D. Eisenhower

Throughout the struggle, it was in his logistical inability to maintain his armies in the field that the enemy's fatal weakness lay. Courage his forces had in full measure, but courage was not enough. Reinforcements failed to arrive, weapons, ammunition, and food alike ran short, and the dearth of fuel caused their powers of tactical mobility to dwindle to the vanishing point. In the last stages of the campaign they could do little more than wait for the Allied avalanche to sweep over them.

General of the Army Dwight D. Eisenhower

Organization of the RAF and Its Modification During the War

GROUP CAPTAIN T. U. ROLFE, *Royal Air Force*

BY 1939 the Royal Air Force was organized very much on lines which have held good throughout the war.

The Air Ministry

At the top the Air Ministry, whose function is to advise the government and to execute such policies relating to the RAF which may be decided by the government, is controlled by a chief executive body known as the Air Council. This Council was increased during the war by three members to a total of ten, all of whom are theoretically equal in status, but the Chief of the Air Staff is generally accepted as the senior service member and head of the RAF. Each member of the Air Council has a large staff of civil and service personnel to assist him in his work. These staffs are formed into directorates on the service side and secretariats on the civilian side. The directorates and secretariats, multiplied very much during the war, are grouped by functions and placed under Assistant Chiefs and Directors General, responsible to the head of their branch.

RAF Commands

The RAF is divided into a number of commands. The commands in the United Kingdom are organized on a functional basis, whereas the commands overseas, for reasons of economy in overheads, are organized geographically. The staffs of all Command Headquarters, however, both at home and abroad, are organized on the same lines. The command staffs are formed into two main branches: the "Air Branch," headed by the "Senior Air Staff Officer," deals with the employment of the force and the execution of operations; and the "Administrative Branch," headed by the "Air Officer in charge of Administration," which deals with matters of organization, the policy aspect of personnel and the logistic requirements of the force.

These two branches together are responsible for executing the policy of the Commander and seeing that his orders are carried out. To assist them they have personnel with specialized knowledge attached to them known as "The Services." They include specialist sections in armament, navigation, photography, meteorology, survey, signals, education, works, equipment, transport, medical, legal and accounts.

The Air Branch is divided into four main sections: plans, operations, intelligence and training, each under its own senior officer directly responsible to the senior air staff officer.

The Administrative Branch is responsible for the policy regarding the organization, personnel and the logistical needs of the forces in the Command. It is normally divided into three sections: the Administrative Plans Section, the Organization Section, and the Personnel Section, each with its own senior officer directly responsible to the Air Officer in charge of Administration.

Group Headquarters

The Commands are normally split up into groups, each with a Group Headquarters, whose duty it is to execute the policy and orders of the Commander in Chief. The Group Headquarters Staff is organized on similar lines to that of Command Headquarters but is naturally very much smaller and normally has no Administrative Plans Section, this work being done by Command Headquaters for the Command as a whole. The number of squadrons or stations in each group depends on many factors, such as the type of aircraft, its operational role, and geographical considerations.

Organization in War

That the pre-war organization of the Royal Air Force stood up to the stress of war seems clear, particularly when one considers the vast expansion from about 70,000 personnel in the years immediately prior to the war to

a total strength of nearly one and a half million on VE-day, and recalls the Battle of Britain and the numerous other achievements of the Royal Air Force during six years of war. Although the organization as a whole remained unchanged during the war, a number of weaknesses became apparent and a number of changes, important in themselves, but not affecting the structure of the Air Force as a whole, had to be made.

The Air Ministry and Commands

As the Air Force expanded the Air Ministry grew larger. Numbers of new directorates were formed and had to be grouped, as already pointed out, under deputy heads of branches. It soon became apparent that one of the greatest weaknesses was in the Personnel Department. It could not cope with the vastly expanding numbers of personnel and never really caught up throughout the war. The scientific and technical side of the Air Ministry and throughout the service had to be reorganized and expanded. New sections were established, and the "Operational Research Section" alone numbers over 200 scientists, although it was only started during the war.

An entirely new ministry was started, known as the "Ministry of Aircraft Production," to cope with the ever-growing aircraft industry and the enormously increased flow of aircraft. This ministry was entirely responsible for the production and allocation of all aircraft both for the RAF and the Navy, and controlled the aircraft industry. Questions of design were very closely coordinated with the Air Staff of the Air Ministry.

Commands maintained very much their original form but they grew so big and so complex that they became independent of the Air Ministry for almost all matters including the posting and promotion of personnel within the command. Only questions of higher Air Force policy were now dealt with by the Air Ministry.

It was found necessary to form two new commands, first, "Maintenance Command" which assumed the responsibility for the maintenance of the Metropolitan Air Force, which had reached such tremendous proportions due, not only to the expansion of the force, but to the greatly increased rate at which aircraft and material were being used.

The second new command, "Transport Command," appeared later in the war, and was the natural outcome of the important place air-transport, both in its offensive and supply roles, assumed in modern warfare.

Administration and Mobility

In the early stages of the war one of the weakest features of our organization was the administrative side, which had insufficient numbers of trained personnel to cope with a war of movement. This was found to be particularly so in the case of the many rapid advances which took place, and the Commander was constantly faced with the prospect of his squadrons outstripping their sources of supply. In this connection the system by which the Army is responsible for the supply and distribution of certain Air Force stores, notably POL (Petrol, Oil and Lubricants), was not always found satisfactory. In a tight spot, either during an advance or a retreat, the Air Force tended to be neglected in favor of Army demands. Another feature which required considerable strengthening, particularly in such countries as North Africa, where few railway facilities exist, was the mobility of squadrons. In the early stages of the war no squadrons, even those which were supposedly on a mobile basis had sufficient prime movers and commanders found it necessary to make all tactical squadrons fully mobile and to form reserve pools of transport.

Tactical

On the tactical side great strides were made in cooperating with the Army, both in the matter of defense and close support. In this connection the Air Force Staffs were, wherever possible, moved alongside the Army staffs with which they were operating and a much greater integration of the two services took place than was the case before the war.

As a result of this very close cooperation, the technique by which calls for close support were answered, was immensely improved. A similar improvement in the integration between Coastal Command and the Navy also took place.

Air Crew Training

One of the branches of the Air Force which underwent a radical change during the war was that of air crew training. Before the war pilots were taught to fly in a number of flying schools. These only took them to the stage where they were competent to handle one or possibly two service types of aircraft. All subsequent operational and tactical training was carried out in operational units.

In the war this system was found to be hopelessly inadequate, squadrons engaged in battle having no time to train the ever-increasing flow of air crews. Consequently Training Command was reorganized to carry out the whole training of all air crews and deliver a finished team to the squadron, capable of taking its place immediately in the battle line.

In order to carry this out a new system was evolved whereby the air crews were passed through three successive stages. First they received their initial training on elementary types at "Elementary Flying Training Schools" run on civilian lines. After they had been taught to fly they then passed to an "Advanced Flying Training School" where they were taught to operate service types of aircraft. From there they went to "Operational Training Units" where they were taught to fly the types of aircraft which they would use in their squadrons and were perfected in the various arts of war such as night flying, navigation, tactics, bombing, etc. Similarly all members of crews such as gunners, wireless operators, navigators, and bomb aimers were thoroughly trained as a team before proceeding to their squadrons.

At the same time this reorganization of the training system was effected, the enormously increased demand for air crews necessitated the introduction of the "Empire Air Training Scheme" whereby most of the elementary flying training was carried out in various countries of the Empire and in the United States. Specialized units such as the Empire Flying School, the Air Fighting Development Unit and the Bomber Development Unit were also established to fulfill war requirements.

Conclusion

From the foregoing it will be seen that with the exception of changes in the field of training, and the forming of the new "Ministry of Aircraft Production," independent of the Air Ministry, few radical changes in organization were made. Other important innovations, such as Maintenance Command and Transport Command were due on the one hand to the immensely increased burden of maintenance, and on the other to the evolution of the transport aircraft. Such other changes as did occur were more changes in emphasis, brought about under the pressure of expansion, and by conditions of active warfare. Generally speaking, the RAF organization which had evolved by the late thirties, stood up well to the impact of war and the enormous expansion and changes in technique which followed.

The soldier, be he friend or foe, is charged with the protection of the weak and unarmed. It is the very essence and reason for his being.

General of the Army Douglas MacArthur

Operations in the Pacific

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Strategy and Tactics in the Early Stages

ON the immense front of the Southwest Pacific Area, approximately 3,000 miles, extending from Soerabaya to Bougainville, operations were conducted that at first glance might look as more or less disconnected actions, but which were, in fact, consecutive elements of a strategic conception announced by General MacArthur with reference to the Papuan Campaign. The outstanding military lesson of this campaign was a continuous calculated application of air power employed in the most intimate tactical and logistical union with ground troops. The offensive and defensive power of aviation and the adaptability, range and capacity of its transport in an effective combination with ground forces, represent a broadened conception of warfare that will permit the application of offensive power in swift massive strokes rather than a dilatory island-to-island advance.

The far-flung operations of this extensive front were firmly held together by the central theme of a general plan based on a most careful and subtle employment of the factor of surprise. With relatively little loss of life and the minimum of assault forces in ground action the enemy was forced back from one position to another. By striking him first on one flank, then shifting the assault to the other or applying pressure from the center, or engaging him in a combined maneuver from several directions, the enemy was completely bewildered. Enemy strongholds, carefully prepared by ground troops, were almost invariably bypassed and their supply line severed, first by air then by small naval craft, eventually forcing the enemy to a retrograde movement, with little or no loss to our ground forces. Once more the employment of enveloping action, the turning movement, and the decisive operation against the flank and rear of the enemy's position proved its worth.

Each phase of advance had as the objective the seizure of airfields which determined the scope and distance of the next advance. As the airline went forward, the naval forces, under newly established air coverage, regained the sea lanes which had been the undisputed principal arteries of the enemy's campaign.

Decision, Tactics and Operations

The tactical and strategical problem involved was the protection of the Australian mainland against further Japanese incursion and to prevent the interruption of United States shipping routes through the southern Pacific. The Japanese hoped to accomplish both a southeasterly advance through New Guinea, Papua and Louisiades and a parallel advance through the chain of the Solomons. The purely arbitrary location of boundaries between the South Pacific and southwest Pacific Areas, allocated the task in Papua to the Southwest Pacific, and in the Solomons, to the South Pacific Theater. Geographically, it was inevitable that the lines of operation of both theaters would ultimately converge in a common objective area, the Bismarcks.

Shortly upon the arrival from the Philippines, General MacArthur made his first great decision; namely, to defend the Australian mainland by a fight to the finish in the New Guinea Area. He promptly displaced his headquarters about 1,500 miles and thereafter followed the forward movement of troops and establishments. The map shows (in several areas) the sequence of events and relative relationship.

Port Moresby: His first task was the speedy development of the sleepy tropical port of Port Moresby (see map, segment 1: Port Moresby) into a vast overseas base and airport. The Japanese reacted promptly and made a drive across the Owen Stanley Range to the gates of Moresby. The result of this action is now a matter of history.

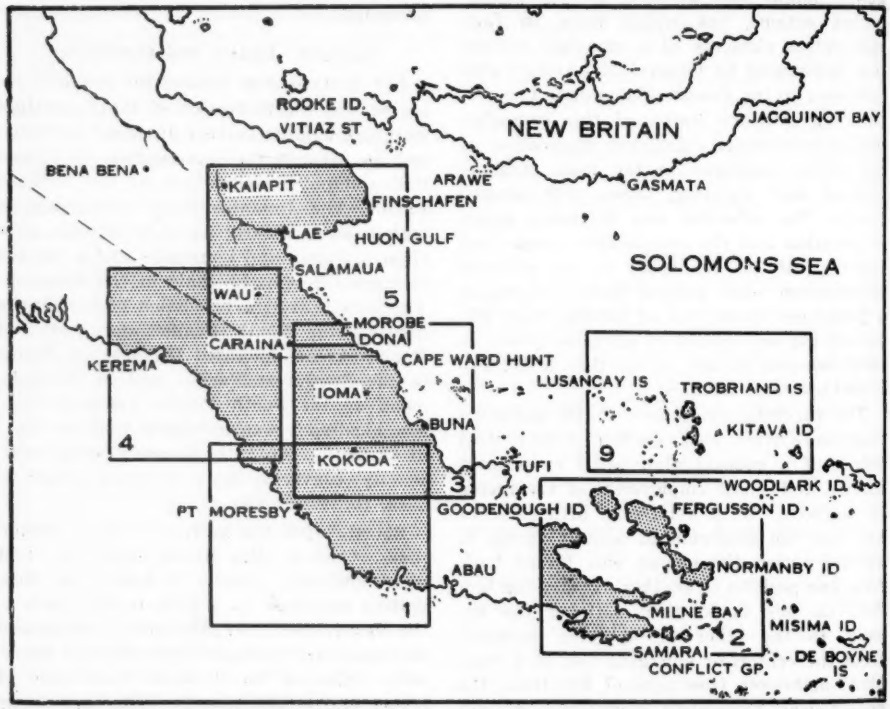
Milne Bay: The Japanese made a parallel

attempt to seize Milne Bay. (see map segment 2: Milne Bay). This had been anticipated and allied forces placed there. The attempt was completely frustrated.

Buna: With the defeat of Horii's Army in Buna (see map segment 3: Buna). General MacArthur began his drive on Salamaua. An intermediate act was a displacement forward of airfields and air equipment. The seizure of airdrome sites through combat, was a preliminary to the construction of airfields, conditioned on an expansion of fighter range. This may be seen in the triangular pattern, Moresby-Buna-Milne Bay, the apex being within supporting fighter range of the base line.

Wau: The garrison at Wau (see map segment 4: Wau) was reinforced and an operational line: Wau-Koniatum-Salamaua determined. The "pincer movement" came complete with a coordinated advance along the coast from Buna via Morobe Bay on Salamaua. Note the triangular pattern with Salamaua as the apex and the line of Buna-Wau as a base.

Lae: The converging attack upon Salamaua (see map segment 5: Lae) served to attract the enemy's attention and resources into this combat area. In the classical scheme of maneuver this represented frontal pressure "to keep the enemy occupied while a decisive double envelopment, the classical operation against front and rear" was in preparation.



For the first time limited amphibious equipment was available to accomplish a dash across Huon Gulf to effect a landing at Hopoi, east of Lae, while a brilliant airborne movement accomplished by our paratroops at Nadzab, in rear of and west of Lae sealed the fate of that locality. This opened the way into the Pamu Valley, to envelop and threaten the shores on Huon

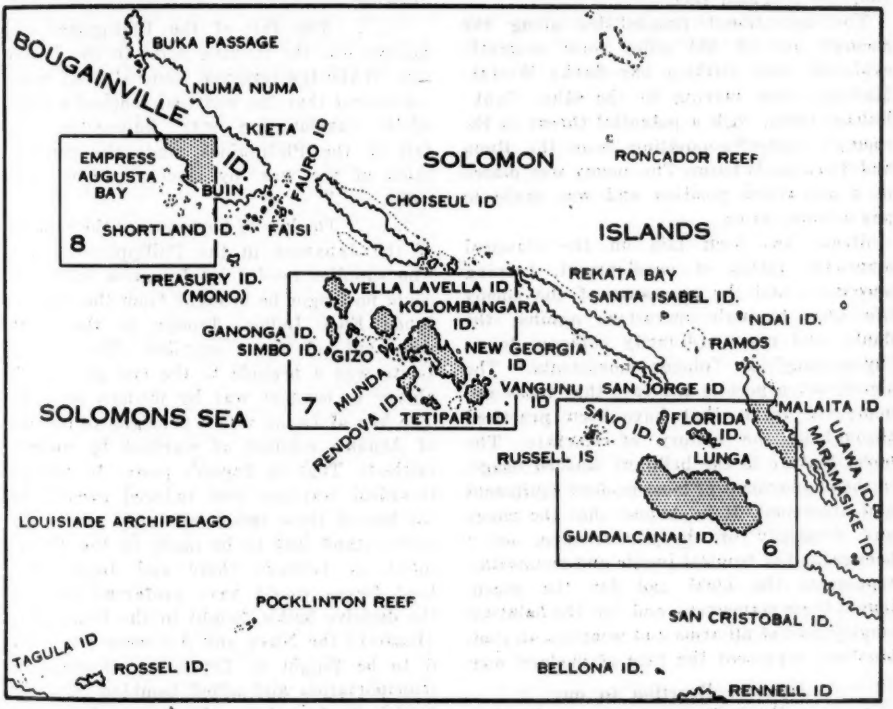
Peninsula, while the quick seizure of Finschhafen, utilizing the same limited amphibious equipment, procured a springboard for further advances.

Related Operations in the Solomons

In the meantime, the South Pacific Forces were engaged in similar operations in the Solomons, parallel to the expansion of the Southwest Pacific Forces in Papua.

development of new airfields as a springboard for further advances.

Bougainville: The South Pacific Army was confronted by the Buna-Faisi area, one of the strongest enemy positions and most heavily garrisoned next to Rabaul itself. In conformity with General MacArthur's pattern of avoiding costly frontal attacks, strong contingents were transported by sea



Guadalcanal: The seizure of Guadalcanal (see map segment 6: Guadalcanal) is well known. The stubborn enemy made it a time consuming venture, with continuous frontal attacks in the Matanikao River area until an envelopment via the west coast brought our forces directly in flank and rear of the enemy and astride his barge supply routes.

New Georgia Group: Then followed the occupation of the New Georgia Group (see map segment 7: New Georgia Group) in hard fighting for Munda and the seizure and de-

to the Empress Augusta Bay (see map segment 8: Bougainville) as a deadly threat to the remaining Japanese garrison on Bougainville and a springboard for the next movement. With Bougainville, the geographical and strategical unity of the South Pacific and the Southwest Pacific forces became irresistible.

Trobriands: In collateral operation, conducted with speed and secrecy certain islands of the Trobriands (see map segment 9: Trobriands) were seized to bridge the gap between the Solomons and New Guinea. Ef-

ficient airfields were constructed at astonishing speed and the intervening sea lanes blocked through the potentiality of continuous air intercepts.

The successful execution of General MacArthur's operation with the combined Southwest Pacific Army and the South Pacific Forces pushed our airlines in close proximity to the enemy's: Ramu Valley, Finschhafen-Empress Augusta Bay.

The operational possibilities along the enemy's arc of 400 miles were promptly exploited, first striking one flank: Wewak-Madang, then moving to the other flank: Rabaul Buka, with a potential threat to the enemy's center, emanating from the Buna and Trobriands bases. The enemy was placed in a precarious position and was made to pay a heavy price.

Stress has been laid on the classical maneuver forms of envelopment, turning movement and the severance of the enemy life lines through operations against the flanks and rear—ordinarily referred to as "by-passing" or "pincer movements." The significant aspect is the fact that these are maneuver forms that have been practiced throughout the history of warfare. The novel feature is the brilliant modern usage, in the employment of most modern equipment and armament. It is obvious that the range and flexibility of the air weapon, on a background of tropical jungle and mountains, represents the ideal tool for the execution of these maneuvers, and that the balanced employment of all arms and weapons, in combination, represent the face of modern war.

Japanese Reaction to our Conduct of Operations

From the following statements made by top-ranking Japanese officers, it is now evident that General MacArthur's terrestial campaigns, culminating in the recapture of the Philippines, represent the single decisive element in the Japanese Empire's early collapse in August.

". . . . The failure of the Japanese Kokoda Trail-Buna Campaign caused the Japanese Army to give up the idea of capturing Port Moresby and lost to it the initiative in the New Guinea Campaign. The loss of Eastern New Guinea caused disruptions of the supply of Japanese forces in the Solomons and New Britain. With respect to Hollandia, this campaign caused the Japanese collapse in the islands north of Australia and forced the Japanese to plan a stand in the Philippines. Some small units were withdrawn to the Philippines but few succeeded in withdrawing . . . ."[1]

". . . . The fall of the Philippines and Saipan was the turning point in the Pacific war. While the Imperial General Staff never considered that the war had reached a point where continuation was 'impossible,' the fall of the Philippines made the continuation of the war 'by modern means' difficult . . . ."[2]

". . . . The loss of Leyte meant the collapse of the Japanese in the Philippine Islands. The supplies needed by Japanese industries could no longer be brought from the Netherlands East Indies. Troops to the south were cut off from supplies. The loss of Leyte was a prelude to the end of Japan's ability to conduct war by modern methods. The loss of Luzon was a prologue to the end of Japan's conduct of warfare by modern methods. That is, Japan's power to conduct technical warfare was reduced greatly by the loss of these two campaigns . . . . A decisive stand had to be made in the Philippines, or between there and Japan. The land forces would have preferred to have the decisive battle fought in the Philippines (Luzon); the Navy and Air were ready for it to be fought in Leyte. A shortage of transportation and allied bombing kept the land forces from being thrown into Leyte . . . because of the speed of the United States advance after the Leyte campaign, the Japanese on Luzon did not have enough time to organize Luzon defenses, or to put real fighting troops into the Clark Field area from where major counterattacks were to be launched . . . ."[3]

". . . . The Japanese disaster in the Philippines culminating in the loss of Luzon,

[1] Lt. General Arisue, Seizo, G-2 Imperial General Staff.
[2] Lt. General Arisue, Seizo, G-2 Imperial General Staff.
[3] Lt. General Yamashita, Tomoyuki, CG 14th Area Army.

was officially viewed by Japanese strategists as necessitating immediate steps to defend the home islands themselves . . . ."[4]

" . . . . Japan suffered great losses of fighting strength in the Philippines and Southwest Pacific. Communications with the south were disrupted. The loss of the Philippines was fatal. The loss of Okinawa and accelerated bombing increased the deterioration of the fighting spirit in the Japanese people. Air and naval bases were acquired by the Allied forces by use of ground forces. Without victories by assault, even B-29's could not have operated . . . ."[5]

" . . . . Regarding the salient factors entering into the defeat of Japan. . .after the Philippines were taken and the supply lines to the East Indies cut, it was impossible to continue fighting except with manpower alone and substitute fuels. Due to fuel shortages any offensive or large scale defensive action had to be curtailed and the use of fuel in training practically eliminated. Many substitutes were tried, even to distillation of pine roots, none of which proved successful. Operations were becoming exceedingly difficult and with bombing by aircraft becoming heavier every day and production being decreased greatly in every raid it became only a matter of time before the inevitable. It was difficult to judge which created the greater damage, the bombings or the lack of fuel, without which protection was impossible. . . ."[6]

" . . . . The physical invasion of Japan engendered great apprehension. Despite the fact that the American B-29's were pounding the Empire, the Japanese Air Force hoarded its strength for use as Kamikaze planes against the invading fleet . . . ."[7]

" . . . . Japan was not defeated by the atomic bomb, nor the participation in the war by the Soviet Union, but by the fact that neither the military nor the government had any real ability . . . ."[8]

" . . . . Japanese intelligence throughout the Philippine campaign had been very poor . . . . Yamashita acknowledged fighting a virtually blind war. However, both Yamashita and staff were aware that the Americans had expert intelligence . . . ."[9]

" . . . . General Yamashita expressed great admiration for the close coordination of all American arms. —Still speaking of Leyte— The weapon most feared by the Japanese had been American mortar and artillery fire. Aerial bombing permitted sufficient warning so that casualties could be limited . . . ."[10]

" . . . . Staff Officers of the Fifth Air Army gave much credit to the B-29 attacks against Japanese cities. The disruption of communications and the industrial system of small factories led to confusion in the military command and fear in the civil population. The extreme scarcity of fuel products, as a result of the sea blockade, severely hampered Japanese air operations. Japan was defeated prior to the use of the atomic bomb . . . ."[11]

" . . . . The resounding defeat dealt the Japanese Navy was perhaps the most decisive factor in the turning of the tables, for this war was primarily a war on and from the sea. At its high-water mark, the Japanese fleet controlled the waters from Alaska to Australia in the Pacific and from Singapore to India in the Indian Ocean, probing as far west even as Africa. Then the attrition of that mighty Navy began. Control of the sea was decided overwhelmingly in the First and Second Battles of the Philippines . . . ."[12]

Within the period 1942-44, the Japanese General Staff poured tremendous amounts of troops, weapons, equipment, shipping and planes into the Southwest Pacific area. It can be said without exaggeration, that on this particular front the Japanese war machine received not only its first definite set back, at Milne Bay and on the Kokoda Trail, but bled itself white continuously

[4] Lt. General Arisue, Seizo, G-2 Imperial General Staff.
[5] Lt. General Kawabe, Masakazu, CG, Air General Army.
[6] Captain Ishiwata, Hiroshi, Staff Second Fleet.
[7] Lt. General Tzoe, Noburu, Chief of Staff, Air General Army.
[8] Colonels Omura and Yamaguchi, Staff Officers, Fifth Air Army.
[9] Lt. General Yamashita, Tomoyuki, CG 14th Area Army.
[10] Lt. General Yamashita, Tomoyuki, CG 14th Area Army.
[11] Colonel Miyashi, Minoru, Chief of Operations, Air General Army.
[12] Rear Admiral Takata, Imperial Japanese Navy.

thereafter. Of the masses of troops and matériel committed to that area—the critical area upon which Japan pinned its hopes of an integrated Asiatic Empire—none were either returned or effectively salvaged; in fact, none were ever successfully evacuated or withdrawn to fight elsewhere than in the defeated or bypassed sectors of their initial historical advance.

It is axiomatic that Japan could wage neither hemispheric war nor effective occupation without the material contributions of its South Pacific conquests; they were acquired initially for that very reason.

Japanese military strategists are unanimous in that the early loss of Leyte spelled immediate doom to Imperial domination southward; Yamashita, against his own strategic judgment, was ordered to shoot his decisive bolt at Leyte, the first threat against the Philippines. The Philippines, strategically, as well as geographically, thus emerged as the *sine qua non* of Japan's dream of conquest, their unexpected sudden loss, and our accelerated exploitation of those islands as advance bases against the Empire itself, rendered military collapse and surrender imminently inevitable.

Japan's potential defense of her home islands against invasion was, in every major respect, fatally crippled by her total and rapid loss of the Southwest Pacific Area and the Philippines. The bulk of over twenty corps were completely lost in the South Pacific.

Her motor transport and air force were soon to be paralyzed by the loss of the East Indies' petroleum. Supply lines and important communications of any sort were severed south of Kyushu. The Philippine battlefields, converted to major air bases, put Japan's heartland within fighter range, particularly the fortified inner perimeter from Korea through Formosa to the Ryukyus.

The Philippine bases for an accelerated invasion of the Japanese home islands presented a prospect at which Imperial authorities were admittedly terrified and unprepared.

With admissions on record from ranking Imperial General Staff members that Japan's collapse was inevitable as early as March, 1945, roughly corresponding to the fall of Manila, the advent of the atomic bomb is seen as but a universally accepted and "face-saving" way out.

Many Japanese agree that the most depressing factor was the helplessness of their own forces to interfere with tactical programs announced by the Allies. Whether it was that the Allies said they would re-occupy the Philippines or bomb certain cities, both soldiers and civilians bitterly contrasted such publicity with the curtain of secrecy behind which the Japanese government operated and their own ignorance of what was happening.

There was a general realization that the Allies were fighting with a combination of brains and machinery against which the much vaunted "Japanese spirit" was relatively powerless.

The steadily growing realization of this situation sapped morale both on the far-flung battle fronts and in the homeland.

There was a natural grasping at straws, in the willingness to believe the official line, as late as 14 August, that the Allied forces were being led into a trap. The Imperial broadcast of 15 August was a stunning blow as it was widely believed that it would be a call to fight to the last man, woman and child.

The degree of control attainable in a totalitarian state is well illustrated by the fact that the names of the Japanese carriers and other vessels sunk and damaged in the Battle of Midway, first appeared in the Japanese press on 12 October 1945.

Such ignorance did not, of course, extend to the higher levels, but available evidence indicates an almost total lack of effective liaison between services and branches of the services. The result was that while the Chief of the General Staff may have had a fairly accurate picture of the situation of the ground forces, according to Allied standards, he was inadequately informed of the situation with regard to the Naval and Air Forces.

Armored Task Forces

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THIS article is not an attempt to justify the use, formations and tactics of armor as employed in the European Theater of Operations, but to present in general a clear idea of one way the armored divisions actually fought through France, Belgium, and Germany. Before we start, let us first of all understand the meaning of the term "Armored Task Forces."

Normally the combat commands of the armored divisions were divided into two or three small forces of combined arms—these were called task forces. The combat elements of an armored division consisted of three tank battalions, three armored infantry battalions, three armored field artillery battalions, one armored reconnaissance squadron, one armored engineer battalion, plus the normal attachments of one tank destroyer battalion, and one antiaircraft automatic weapons battalion self propelled, plus attached field artillery varying from one battalion to a group.

The armored divisions were normally subdivided into three equal combat commands. The average combat command was composed of a headquarters and headquarters company, combat command; one tank battalion; one armored infantry battalion; one armored field artillery battalion, either attached or in direct support; one armored engineer company; one tank destroyer company; and one battery, antiaircraft artillery automatic weapons, self propelled.

Most of the thirteen light armored divisions in the European Theater of Operations (2d and 3d Armored Divisions under T/O&E 17, 1 March 1942 are considered heavy armored divisions) normally used the following type of task force organization at one time or another. The combat command (CC) was divided into two task forces (TF). The remainder of the tank destroyer and armored engineer companies, and the entire antiaircraft automatic weapons battery composed the combat command reserve. The armored field artillery battalion was placed in direct support of both task forces. We see that TF 1 was heavy in tanks, having two medium tank companies to one armored infantry company. TF 2, on the other hand, was heavy in infantry, having two armored infantry companies to only one medium tank company.

TF 1 *	*TF 2* **
TK Bn (-1 Med Tk Co)	Armd Inf Bn (-1 Armd Inf Co)
1 Co Armd Inf	1 Med Tk Co
1 TD Plat	1 TD Plat
1 Armd Engr Plat	1 Armd Engr Plat

* This TF is commanded by the CO of the Tank Battalion.
** This TF is commanded by the CO of the Armored Infantry Battalion.

The fact that these task forces were unbalanced was a disadvantage since the CC commander seldom knew what type of resistance he would encounter in his zone of action before he committed his TFs to specific routes. Often he discovered that it would have been better to have had these TFs switched, but by the time that information was known it was too late to make the change. An equal proportion of tank platoons to infantry platoons would have been more desirable, but could not be obtained without splitting front line companies, which proved unfeasible due to administrative difficulties. The big advantage that this task force possessed was the fact that it contained all the combat arms in sufficient proportion under a definite commander, a battalion commander who had the necessary staff, communication, supply and administrative facilities from his own battalion headquarters to assist him in maintaining control.

The organization of the armored division into task forces proved itself to be especially adapted for pursuit when the terrain and road net permitted. Armored divisions with two combat commands abreast—each having two task forces abreast—can cover wide fronts, the distance between the task forces being limited to the range of the artillery in support. This means that the

division, marching on four routes, is provided great flexibility in being able to bypass strong resistance encountered on any one route.

The march formations of armored task forces were organized as follows:

TF 1		*TF 2*	
Advance Guard	* 1 Med Tk Co 1 Armd Inf Plat Assault Gun Plat (Tk Bn) 1 Armd Engr Plat	Advance Guard	* 1 Armd Inf Co 1 Med Tk Plat Assault Gun Plat (Armd Inf Bn) 1 Armd Engr Plat
Flank Guard	1 L Tk Co	Flank Guard	MG Plat (Armd Inf Bn) Recn Plat (Armd Inf Bn)
Main Body	* Hq & Hq Co (-) Tk Bn * Med Tk Co Armd Inf Co (-) TD Plat Medical Det Maint	Main Body	* Hq & Hq Co (-) (Armd Inf Bn) * Armd Inf Co Med Tk Co (-) TD Plat Medical Det Maint

* Artillery Forward Observers Accompanied.

Now let us look at the advance guards since most of the fighting was done by them. We see that it is commanded by a company commander whose company is the main fighting force—either tank or armored infantry. There is a platoon of tanks or infantry to work with this company. The point usually is a platoon of tanks and a platoon of armored infantry. The advance guard commander has an artillery forward observer with him. The 105-mm assault gun platoon is with the advance guard to assist in eliminating road blocks by direct fire. An engineer platoon is with the advance guard for the same purpose—to eliminate road blocks by direct action, that is, to clear minefields and booby trapped road blocks as rapidly as possible, and to assist in bypassing small blown bridges by selecting, improving, and maintaining fords. Having these attachments well forward with the advance guards saves a great deal of time, and enables the armored columns to keep hot on the enemy's heels. As in all advance guard action, these task force advance guards were committed rapidly and aggressively. Usually when the main body was committed it too was employed with speed—many times directly from march column.

As far as can be determined by the author from after action reports of the armored divisions operating in the ETO, the assistance which the task forces gave one another was indirect rather than direct in most cases. By this I mean that if TF 1 of a combat command was stopped by strong enemy resistance and TF 2 managed to get through, then it kept driving forward, usually causing the resistance in front of TF 1 to withdraw by the mere threat of TF 2's location. There was another reason for indirect rather than direct support—this was the air support provided for the armored columns by the Tactical Air Command. If a TF was stopped by strong resistance, an air strike or two on the enemy position would jolt him sufficiently to enable the TF to continue forward. It is difficult enough to coordinate an air strike without having to worry about a friendly column coming into the target area from the enemy's rear or flank. Besides, it is faster to get a strike than to have a column change direction and get set for a coordinated attack.

Let me quote an historical account of a fine example of efficient task force operation by the 6th Armored Division in pursuit operations.

"During the drive into Central Germany the 6th Armored Division was directed to séize Mühlhausen, a city of thirty thousand inhabitants.

"On the night of 3-4 April 1945 one bridge over the Werra River was captured intact. The division crossed on this bridge, Combat Command 'B' leading, followed without distance by Combat Command 'A.' Vehicles were crossed without distance as enemy air was not active and speed was necessary. The flow of traffic over the bridge was never halted.

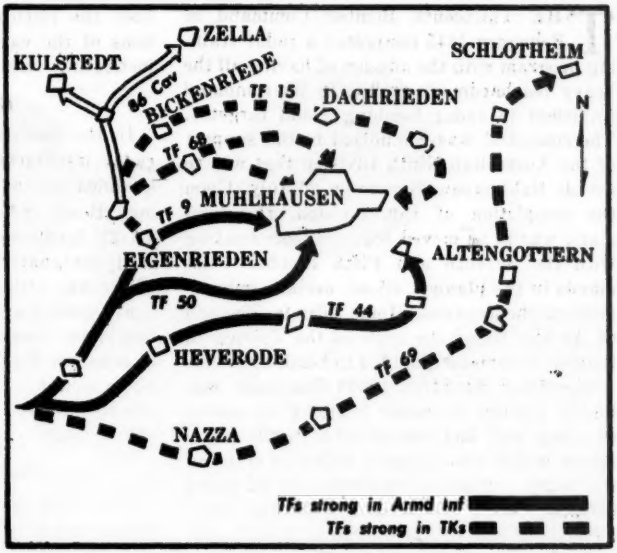
"CC 'A' was ordered to close in on the city from the north and northwest, CC, 'B' ordered to close on the city from the south and southwest. A hasty reconnaissance was

made by combat commanders and their task force commanders. Each of the combat commands had three task forces. Under CC 'A' were Task Forces 15, 68 and 9; under CC 'B' were Task Forces 50, 69 and 44. The tables below show the composition of these Task Forces.

"CC 'B' assembled near Heyerode, CC 'A' southwest of Eigenrieden. (See Sketch) Both commands started the encirclement of Mühlhausen simultaneously.

"Opposition was light. Small forces of enemy infantry were cleared up from the small towns adjacent to Mühlhausen. Antitank fire was encountered by TF 15 in Bickenriede and in Dachrieden and was quickly overcome. TF 15 and TF 69 both bypassed Mühlhausen as if to continue east, then TF 15 turned south, then west, and blocked all eastern exits of the city. Meanwhile TF 69 drove past the city and blocked from the north and east. By dusk all task forces were in position as shown on sketch, and held Mühlhausen in a vise-like grip. The division commander decided that the attack to clear the city would be launched at 0700, 5 April 1945. All artillery was emplaced so as to give support if heavy resistance was encountered. All task forces held in place except TF 9 and TF 50, which drove into the city. Sporadic street fighting was encountered. Some three or four hundred prisoners were taken in the town, whereas some twelve hundred were gathered in by TF 15 as they tried to flee eastward.

"The city was cleared by 0930, 5 April 1945, with a minimum of losses. The enemy troops were well equipped and had excellent morale. It was learned upon questioning the German officers that the rapid encirclement had completely disrupted their plan of defense; thus the quick capitulation of the entire garrison."



CC "A"

TF 15
15 Tk Bn (-1 Med Co)
Armd Inf Co
TD Plat
Armd Engr Plat
212 Armd FA Bn

TF 68
68 Tk Bn (-1 Med Co & 1 Lt Co)
Armd Inf Co
TD Plat
Armd Engr Plat

TF 9
9 Armd Inf Bn (-1 Co)
Med Tk Co
TD Plat
Armd Engr Plat
274 Armd FA Bn

CC "B"

TF 50
50th Armd Inf Bn (-1 Co)
Med Tk Co
TD Plat
Armd Engr Plat
231 Armd FA Bn

TF 69
69th Tk Bn (-1 Med Co)
Armd Inf Co
TD Plat
Armd Engr Plat
128 Armd FA Bn

TF 44
44th Armd Inf Bn (-1 Co)
Med Tk Co
TD Plat
Armd Engr Plat

Radar Intelligence Procedure in the Thirteenth Bomber Command

MAJOR GEORGE R. KAUFFMAN, *Air Corps*
Instructor, Command and Staff College

THE Thirteenth Bomber Command in February 1945 instigated a radar training program with the mission of having all the heavy bombardment groups in its command proficient in radar bombing (land targets). The command was committed to the support of the Australian Ninth Division that was to invade Balikpapan, Borneo on 20 July. Upon the completion of this mission, the command was to be moved forward, coordinating with the Seventh and Fifth Bomber Commands in the planned all-out aerial bombardment of the Japanese Home Islands. The end of the war found the units of the Thirteenth Bomber Command qualified to bomb by radar.

The 868th Squadron (B-24 Snoopers) was highly trained in radar bombing of enemy shipping and had considerable battle experience which was of great value in training the heavy groups in the techniques of radar bombing. With the assistance of the intelligence officers of the 868th and state-side trained radar intelligence officers, the following radar intelligence procedure was adopted by the A-2 Section. This procedure is not of the textbook type, but it proved to be successful and efficient.

Personnel

Three radar intelligence officers, the first assigned to this command, reported on 24 February 1945. One was assigned to Headquarters, Thirteenth Bomber Command, the others to the 5th and 307th Bomb Groups (B-24). These officers were augmented later by four more radar intelligence officers and two radar photo intelligence officers, members of this command, after their return from temporary duty in the United States for the purpose of attending the Radar Intelligence School at Langley Field, Virginia, and the Radar Photo Intelligence School at AAFTAC, Orlando, Florida. Under the A-2 of the bomber command and the S-2's of the heavy bombardment groups, these officers utilized the clerical, filing, and reporting systems of the various intelligence sections for instituting radar intelligence procedures.

General Duties

In the bomber command headquarters the radar intelligence officer of the A-2 section, qualified also as a radar observer, performed operational (A-3) as well as intelligence (A-2) functions. No H2X (equipment especially designated for radar bombing) bombing officer was utilized in the A-3 section. In the heavy groups and the 868th Squadron a qualified radar observer was designated as group or squadron H2X bombing officer in the operations section (S-3) to work with the radar intelligence and the radar photo intelligence officer (S-2).

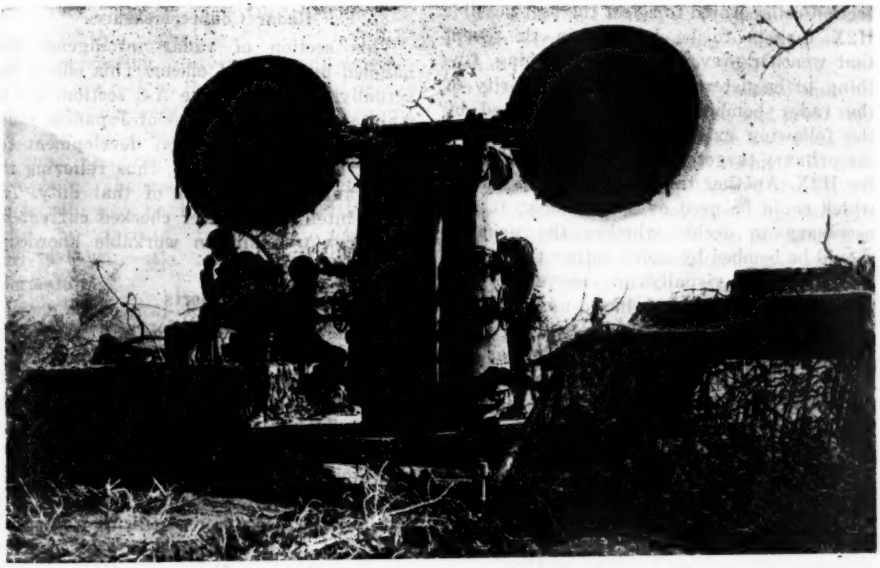
Radar Target Data

This work was closely associated with the normal work of the A-2 target data section (target data for visual bombing). The essential target data for proper planning of radar bombing missions, for target study purposes, and for mission folders consisted of large scale maps or target charts, standard photos, and radar scope photos. Special radar navigation maps and scope photo strips for navigation purposes were of little, or no importance. This is an obvious result of the fact that most targets in this sector of operations (SWPA) have been on or near some coastline. Consequently, radar navigation was so easily performed that nothing more than normal navigation charts were necessary.

Large Scale Maps or Target Charts

These were necessary for mission planning in order to determine the best axis of attack on all radar targets, and to determine offset distances and bearings in cases where the target itself could not be distinguished by the radar set. They were also one of the chief aids in target study by radar operators and

bombardiers. As a general rule, these were available in scales of from 1:100,000 to 1:20,000 on many of the targets, but in some cases the best available map coverage was 1:1,000,000. In these latter cases, it was necessary to rely upon substitutes, such as standard photos.



Radar in Operation. (Signal Corps Photo.)

Standard Photos

These were necessary for determining exact target composition and points of identification on nearest coastlines, as substitutes for large scale maps or charts, and for other target study. Photo coverage of targets was good, and could be obtained in almost all cases from the files of the target data section. Standard photos also revealed information about coral reefs along shorelines. These coral reefs, prevalent in this theater, caused variance in radar returns according to tides and necessitated consideration of their effects on the appearance of coastlines on the scope.

Scope Photos

These are extremely important in mission planning and crew briefing. A detailed study of scope photos must be made in order to determine what target returns will be received or what aiming points show up to best advantage on various headings. It cannot be over-emphasized that these must include scope photos taken at short ranges. Preferably scope photos should be available at approximate ranges of forty to fifty miles, twenty miles, ten miles, and seven to five miles, Regular K-24 cameras were converted to scope cameras and excellent scope photos were obtained on many of the targets in this area. A scope photo file was maintained in this headquarters (radar target section) to furnish scope photographs for briefing and mission folder use.

Target Assignments

Bombing restrictions greatly hampered assignment of targets for radar bombing. On the majority of missions in the Philippines during 1945 all radar bombing was prohibited because of these restrictions. In these cases the equipment was used only for navigation and for target approaches. In Borneo, the

Celebes, Java, Formosa, and other sections of this area, radar bombing could be utilized and assignment of H2X targets became a part of standard procedure. The selection of these targets was based upon the recommendations of the A-2. The radar intelligence officer and the head of the target data section collaborated to select the best possible H2X targets to be bombed in the event that weather prevented visual bombing. One thing to be determined was the priority of the radar bombing. This is illustrated by the following example. Let us assume that the primary target was also a suitable target for H2X. Another target was located nearby which could be used as a secondary. It was necessary to decide whether the primary should be bombed by radar rather than bomb the secondary visually or vice-versa. This priority was established, based upon relative importance of the two targets and the probability of successful radar bombing as opposed to visual bombing of the secondary.

Operational Recommendations

1. Approach to the target and initial point was recommended by radar intelligence officer in order to give sufficiently long run for the radar operator and bombardier to determine course and rate by means of synchronous offset radar bombing method.

2. The axis of attack recommended was based on target study including consideration of best target returns, characteristics of target, flak defenses, and bombing method.

3. The aiming points were selected, in event offset bombing was necessary, to give distinct and sharp returns on the radar set.

4. Bombing method recommended: Synchronous direct or synchronous offset were standard methods for daylight formations. Some night bombers, bombing as individual ships, sometimes used the APQ-5B (Auxiliary bombing computer for airborne radar sets) attachment for bombing from approximately 10,000 feet, or used H&B (code name for a method of radar bombing) direct bombing with radar operator dropping the bombs.

Training

The radar intelligence officer of this headquarters (A-2) together with the radar officer in communications (RCM officer) instigated and supervised training of all "lead" crews in radar navigation and bombing. This training embodied ground classes, simulated flights on the Supersonic Trainer, and practice or training bombing missions.

Radar Countermeasures

This section of radar intelligence was handled by an RCM officer. This officer was actually assigned to the A-3 section, but he maintained necessary files of Japanese radar installations and technical development for use of both A-2 and A-3, thus relieving the radar intelligence officer of that duty. The radar intelligence officer checked current information to maintain workable knowledge of RCM status.

Reports

To obtain necessary information on operation and use of H2X equipment it was found that existing reports of lower units were sufficient when augmented by "H2X Bombing Reports." This latter report gave specific results of use of H2X equipment which otherwise would not be covered in normal reports and gave this headquarters (A-2) a method of checking for proper utilization of H2X equipment. This report was required to be submitted for each flight of an H2X equipped aircraft, whether or not the H2X was used for bombing. On training missions, effort was made to photograph every bomb hit. The standard reports on these practice missions plus the "H2X Bombing Report" and the photographs made a sound basis for constructive criticism of the mission after the reports and photographs had been analyzed by the radar intelligence officer (intelligence and operations).

Miscellaneous Duties

Check and analyze information of H2X activities of other air forces; aid in briefing radar crews of subordinate units; aid in development of scope photography in lower units; arrange for scope photo coverage of specific targets; compilation of slant range tables for sighting angles in synchronous offset bombing.

The Fourth Dimension of Terrain

MAJOR JAMES E. WILSON, JR., *Cavalry*
Former Instructor, Command and General Staff School

"THE secrets to all battlefields are *disclosed in advance* by a careful study of the terrain . . . . ." (italics are present author's). This observation by a very competent War Department Observer is the keynote of this paper.

The forecasting of terrain conditions *before they are met*, so that plans for all operational contingencies and enemy capabilities may be considered, is characteristic of sound planning. *Forecasting* is the key word here. The risks and uncertainties of the terrain may be, to a large extent, eliminated by terrain intelligence prepared from a systematic analysis of scientific information.

From a topographic map, a soldier with an "eye for the ground" can evaluate quite nicely a given piece of terrain in terms of observation, fields of fire, cover, etc. In such an evaluation the familiar dimensions of distance and relief are employed. The careful, questioning individual wants to know more: How "tankable" is the ground off the roads? How easy is digging-in going to be along that ridge? What particular area does the enemy control where extensive underground works might exist? Such questions involve another dimension—the subsurface or "fourth dimension" in terrain.

This "fourth dimension" is an adjunct to terrain intelligence. It is obtained by an analysis of scientific information (geology, geography, soils, engineering, etc.). To outline this analytical procedure, let us take a hypothetical piece of terrain:

Figure 1 is a *topographic map* from which the tactical effect of the terrain may be evaluated.

Figure 2 is a geologic map of the same area. This information is of no practical value until it has been analyzed and translated into military terminology by a person trained in military geology.

Figure 3 shows a method of analysis and translation.

Figure 4 is the final product—scientific information expressed in military terms so that it may be of use in the field.

As far back as 1926,[1] Colonel (now Major General, retired) J. F. C. Fuller of the British Army foresaw the embodiment of such a procedure when he said: " . . . we can plan out a strategic and tactical map on the lines of a geological chart, and from this map we can learn the possible and then the probable movements of the enemy." In this war the Military Geology Unit of the United States Geological Survey, working through the Intelligence Division of the Corps of Engineers has done a remarkable and stupendous task. This unit had a start-from-scratch beginning in the spring of 1942, and its main products at that time were data on water supply and construction materials. By the fall of 1944, excellent folios were being produced with maps, diagrams and tables on terrain appreciation, trafficability, routes of movement, pictorial views, vegetation, climate, etc., as well as water supply construction material and airdrome sites. The history of the unit's relation with the field armies was one of mutual education and salesmanship. The geologist had to find out what the military wanted to know and the military what the geologist could contribute.

Much of the lack of "get-together" has been due in no inconsiderable part to the geologist's unfamiliarity with military techniques and the resulting uncertainties as to the application of his science. Colonel Fuller (op.cit.) observed on this science-military combination: "In this study the civil sciences can help us, and are progressively becoming, not mere hand-maids of the soldier, but his closely collaborating partners. To render this collaboration possible it is most necessary for the soldier to realize that, though he is the expert authority on the application of means, the scientist is the expert authority on their creation." Mr. C. E.

[1] The Foundations of the Science of War.

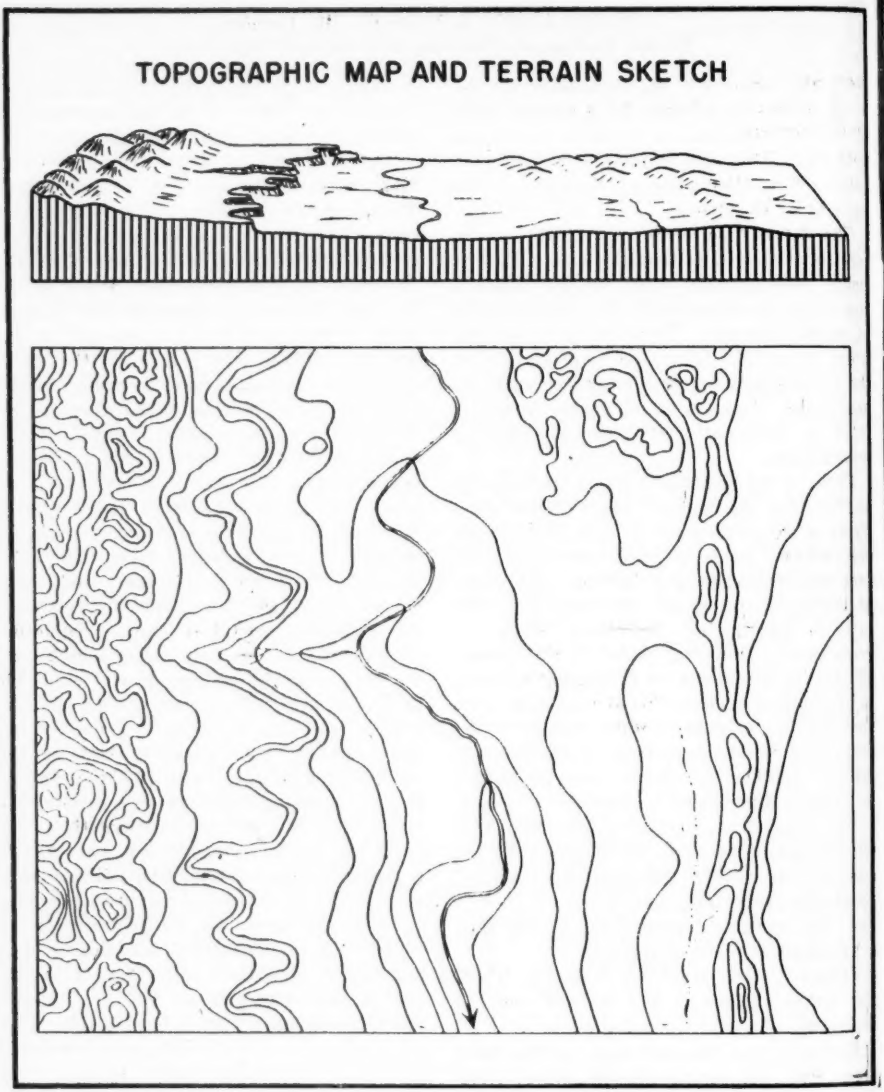


Figure 1.

The tactical effect of land forms is readily appreciated from a topographic map. The dimensions concerned are those seen in a three-dimensional sketch of the terrain.

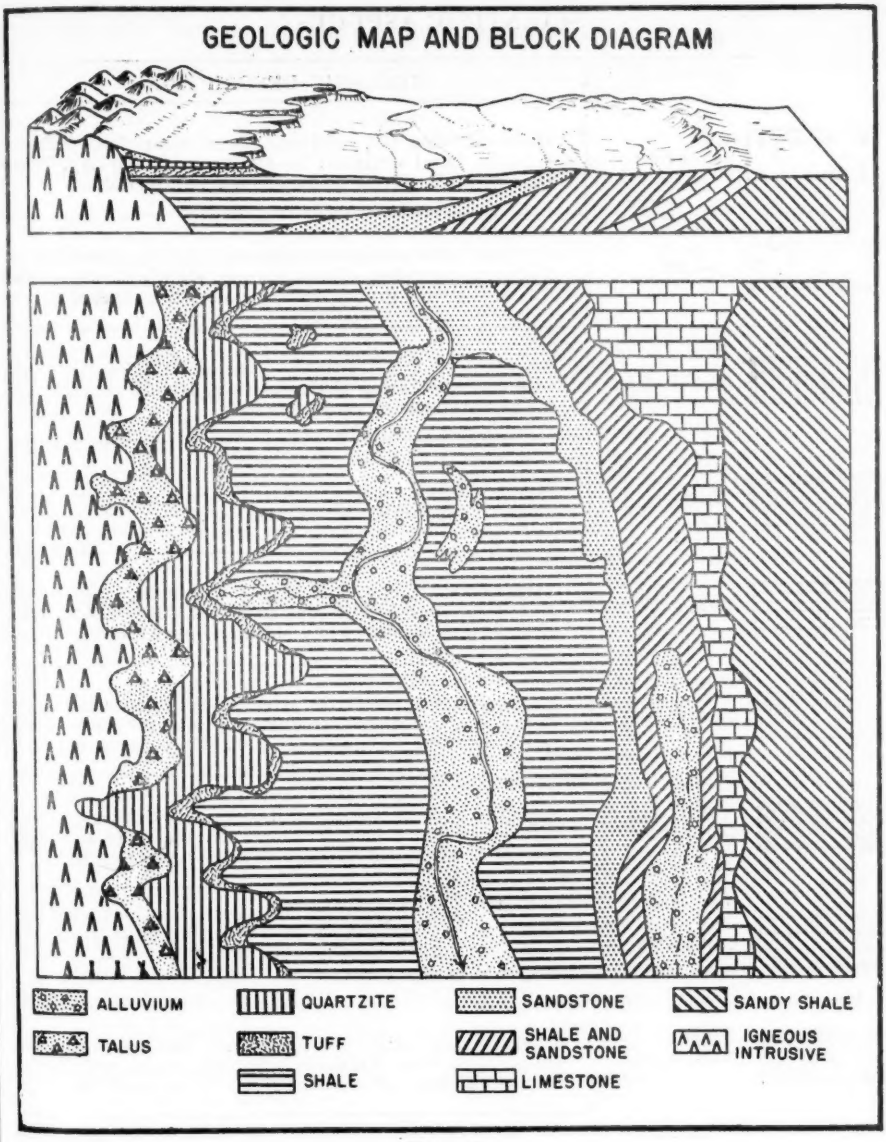


Figure 2.

A geologic map depicts the surface exposures of strata and their relationship below the surface. The physical characteristics of these strata are the key to the tactical effect of the below-surface dimension of the terrain.

NOTE: See Figure 3 for discussion of map units.

SCIENTIFIC ASPECTS

	GEOLOGIC DESCRIPTION
ALLUVIUM	Unconsolidated silt, sand and gravel along flood plains of streams. Local lenticular beds of very impure clay. Thickness variable. Forms discontinuous high terraces.
TALUS	Outwash from adjacent highlands. Lithology variable, reflecting composition of local sources. Mainly unconsolidated clastics—poorly graded from boulders to gravel-size.
QUARTZITE	Gray, thick-bedded, splintery fracture. Uniform in thickness and weathering characteristics. Highly resistant and forms "caprock" of escarpments.
TUFF	Massive, well compacted tuff with some lenticular beds of highly tuffaceous sandstone and clay.
SHALE	Thick-bedded, sandy, tuffaceous to bentonitic clay. Highly glauconitic and fossiliferous in places. "Heaves" on sides of knolls and weathers to a black and gray gumbo.
SANDSTONE	Medium-bedded, limonitic streaks, some lenticular ironstone beds. Weathers irregularly, from friable to hard, fairly resistant rock, depending on iron cementation.
SHALE AND SANDSTONE	Sequence of thin bedded sandstones and thick shale beds with occasional pebble conglomerate. Weathers to brown, grandular clay-loam mixed with some rock fragments.
LIMESTONE	Cherty, massive, coralline limestone. Becomes sandy in friable locally. Resistance to weathering quite variable—corralline masses usually quite resistant, otherwise cavernous to poorly resistant.
SANDY SHALE	Thick bedded, sandy and silty shale with numerous lenticular sand beds. Weathers to porous, sandy, well drained loamy soil. Some local cementation in the sand beds.
IGNEOUS INTRUSIVE	An undifferentiated complex of gabbro and peridotitic rocks with some metamorphics. Zone of metamorphism of sedimentary rocks covered by talus. Erratic system of joints and small faults. Weathers into steep and rough slopes with very little soil.

Figure 3.

MILITARY ASPECTS

MOVEMENT	EXCAVATION
Loose nature of gravels and sands makes footing unstable. Intermittent areas are wet to marshy. Probably some zones of quicksands. Subject to flooding and dry-out is slow.	Excavation easy, but walls slump easily and require support. High water table causes flooding of excavations.
Movement easy except where steep slopes, boulders and ravines occur. Low ridge pattern at right angles to axis of mountains.	Excavation easy in zones where rocks are dominantly fine; difficult in zones where boulders and larger fragments exist. Walls generally require support but excavations should be dry.
Movement moderately easy. Surface is bare rock for most part; may be stony in places. Well drained, dries easily.	Excavation almost impossible except with powered equipment or blasting. Walls stable; drainage good provided hole penetrates to volcanic ash below.
Area of exposure mainly on escarpment face.	Easily excavated by hand tools; walls stable; well drained, except at base. Unit (3) forms good roof for tunnels and caves.
Initial movement easy when dry; slippery and uncertain when damp; extremely difficult when wet. Continued use when wet produces a bottomless quagmire. "Gumbo clay" balls up on wheels and eventually freezes movement. Dry-out extremely slow and ruts remain rough.	Excavation easy with hand tools; walls stable when dry, heave and slump when wet. Excavations likely to be damp or flooded except in very dry weather.
Movement good all weather. Loose sand soil not deep; compacts well when wet. Dry-out is fast.	Excavation easy except in zone of iron-cemented sandstone; walls stable for shallow excavations; larger works require support. Dry except near base along eastern side.
Movement moderate to easy; variable, with a "banding" running generally north-south. Dry-out fairly rapid. Soil has numerous slab-like rocks but are no hinderance to movement.	Excavation fairly easy by hand tools, occasional thin, hard rock. Walls probably stable, but excavation likely to be damp and hold water.
Movement somewhat difficult for vehicles due to rough and "pockety" surface and to steep slopes. Foot movement good all weather.	Excavation extremely difficult except along fissures or joints and where rock is soft or "mealy." Joints are erratic in direction and extent. Numerous caves already exist. Orientation is commonly with long axis slanting downward to the west and floor stepped down in the same direction. Best level axis is north-south.
Movement good all weather. Combination of sands and clay produces a firm, well-drained soil with quick dry-out characteristics. Soil is locally stony but not to detriment of movement.	Easily excavated; stable walls; fairly well drained. Deeper holes may have seeps in bottom.
Movement extremely difficult for vehicles and difficult for foot troops. Even where slopes are not a prohibitive factor, rocks are bare, sharp-edged and slick when wet.	No extensive excavation by hand tools possible; where excavation is possible, walls are stable but seepage is likely.

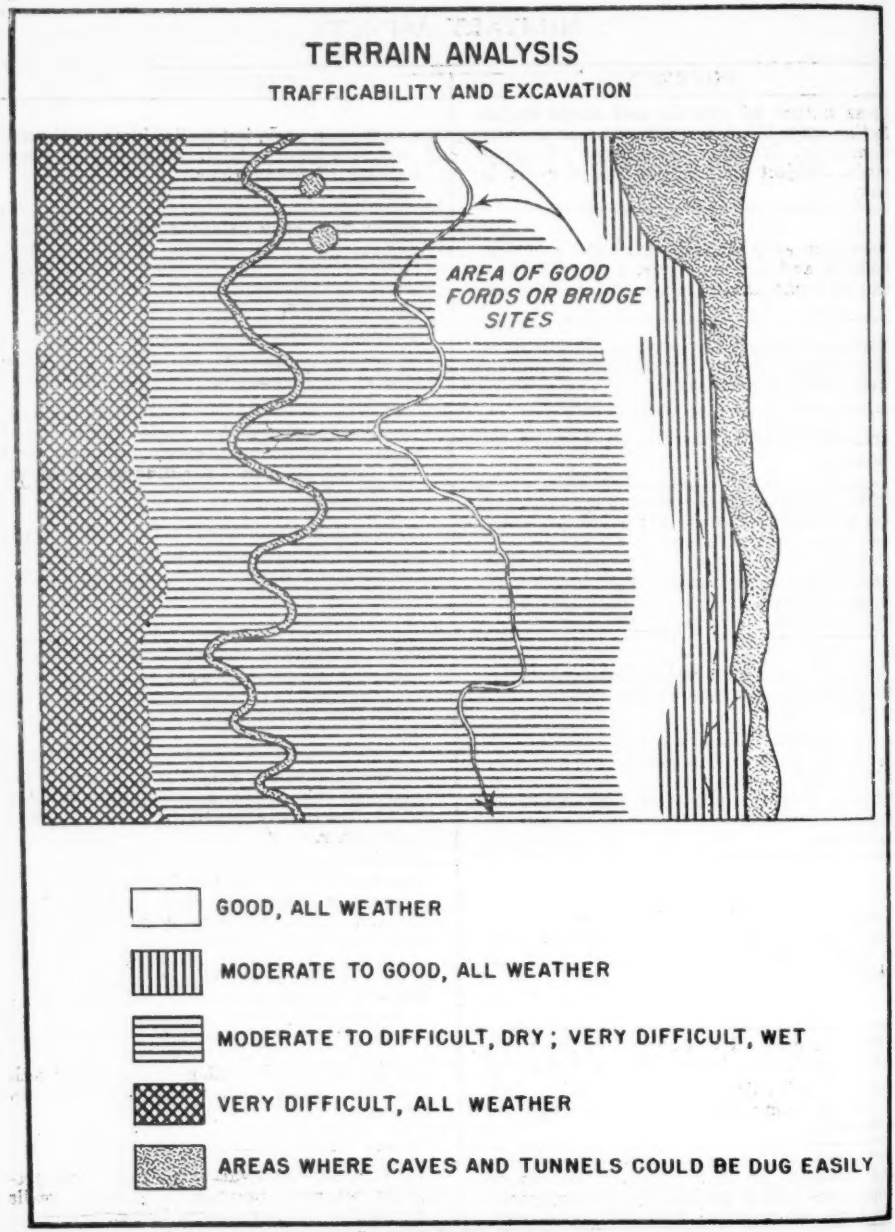

TERRAIN ANALYSIS
TRAFFICABILITY AND EXCAVATION
AREA OF GOOD FORDS OR BRIDGE SITES
GOOD, ALL WEATHER
MODERATE TO GOOD, ALL WEATHER
MODERATE TO DIFFICULT, DRY; VERY DIFFICULT, WET
VERY DIFFICULT, ALL WEATHER
AREAS WHERE CAVES AND TUNNELS COULD BE DUG EASILY

Figure 4.

Erdmann, in his *Geology Applied To Principles of War*,[2] feels that "in so far as geology is concerned, other reasons (for this divergence) may be: suspicion of some of the fanciful speculations—by certain early workers . . . (and) finally, because undue emphasis has been placed on the historical aspects of geology." In a United States Geological Survey Professional Paper (1920) on *The Use of Geology on the Western Front*, Colonel Alfred H. Brooks, former Chief Geologist of the AEF in World War I, made the following points which would help rectify this fault:

"1. The general principles of geology and their applications to war must be made a part of military education.

"2. Peace time preparations should include the collection and coordination of geologic data relating to *all possible theaters of operations*. (Italics are present author's.)

"3. A staff of geologic engineer reserve officers should be organized. This should be made up of experienced professional geologists who should receive the special peace time training necessary to develop them to their full usefulness when called into active service."

[2] "Bulletin of the Geological Society of America," Vol. 54, pp. 1169-1194, 1943.

In the same year, 1920, Colonel Brooks made a prophetic statement:

"Should warfare continue to develop on the scale and with the same scientific refinement witnessed by the last five years, geologic maps will in time be considered almost as essential to offensive and defensive operations as are topographic maps." Germany early recognized the military application of geology and maintained a persistent interest in the subject. Captured German invasion plans of southern England had "Achtung! Consult the Geologist!" interpolated in every other sentence. Germany's Italian Campaign was an excellent demonstration of the principle of economy of force—an effective balance of troops, terrain and defenses. The uncanny use of terrain by the Germans in Italy was not merely chance. They had 600 geologists with their armies in Italy alone; we had a total of about 100 for all our theaters, including the zone of interior.

With present day techniques in radar, aerial observation, photography and interpretation, guided missiles, and atomic bombs, the need for dispersal, underground structures, and factories, etc. is more imperative than ever. Under these conditions, mere distance and relief lose some of their tactical and strategical effect and the "fourth dimension" of terrain becomes the really critical dimension.

The infantry soldier, well-trained in stealthy approach and in the art of taking cover, makes a small target, and if he is an expert rifleman there is nothing that can take his place on the battlefield.

General of the Armies John J. Pershing

Supply of an Armored Division in Combat

Extracts from a letter from COLONEL E. BUSCH, *Quartermaster Corps*, Quartermaster, Third Army

PRIOR to the invasion of France, it was impossible to obtain an agreement on the daily POL [petrol, oil, lubricants] requirements of an armored division. The estimates varied between wide limits—as nearly as I can recall, between 40,000 and 100,000 gallons of gasoline per day.

These data were compiled by Lieutenant Colonel W. A. Boyle, Division Quartermaster, 6th Armored Division, from records maintained by his office during the campaign through France, Belgium, Luxembourg, and Germany for the period 27 July 1944 to 9 May 1945, inclusive.

The 6th Armored Division played a full part in the campaign. During the initial phase, it operated in the Brittany peninsula, later moving to the Eastern Front.

POL and Rations consumed by the 6th Armored Division during the campaign of Third Army through France, Belgium, Luxembourg, and Germany, starting at the Normandy beaches and ending at Altenburg, Germany, for the period 27 July 1944 to 9 May 1945, inclusive—total 287 days:

Item	*Consumed*	*Average per Day*
V-80 Gasoline	5,497,770 gal.	19,156.00 gal.
V-80 per food ration		1.32
Kerosene	3,815	13.3
Diesel	6,552	22.8
White Gasoline	1,635	5.7
73 Octane Gasoline	3,830	13.3
SAE No. 10	13,457	46.8
SAE No. 30	60,675	211.4
SAE No. 50	45,205	157.5
SAE No. 90	7,105	24.7
GP No. 1	23,856 lbs.	83.1 lbs.
GP No. 2	40,922	142.5
GP No. 3	6,883	24.0
GP No. 4	129	.45
* Coal	296 tons	1.00 ton

Approximate tonnage: 73.32 per day.

* Does not include quantities found locally within unit areas.

Rations consumed during the 287 day period:

	Total	*Average per Day*	
"A"	2,344,605	8,169.35	
"10-1"	929,385	3,238.28	
"K"	576,566	2,008.94	
"C"	315,738	1,100.13	
"D"	(104,616)	(364.50)	No ration. Used as supplement.
TOTAL	4,166,294	14,516.70	Less "D's"

Approximate tonnage: 30.6 per day.

POL and Rations consumed by the 6th Armored Division during the last 98 days of the campaign, 1 February 1945 to 9 May 1945. This was a period of intensive operations starting in the vicinity of Luxembourg and ending in Altenburg, Germany.

Item	*Consumed*	*Average per Day*
V-80 Gasoline	2,422,620 gal.	24,721.00 gal.
V-80 per food ration		1.75
Kerosene	3,170	32
Diesel	2,975	30
White Gasoline	840	9
73 Octane Gasoline	3,830	40
SAE No. 10	2,605	26
SAE No. 30	26,925	274
SAE No. 50	23,245	237
SAE No. 90	3,965	40
GP No. 1	10,048 lbs.	102 lbs.
GP No. 2	20,070	204
GP No. 3	482	5
GP No.4	77	.75
* Coal	66 tons	.67 ton

Approximate tonnage: 93.45 per day.

* Does not include quantities found locally within unit areas.

Rations consumed during the final 98 day period:

	Total	*Average per Day*
"A"	785,769	8,018
"10-1"	228,615	2,333
"K"	222,120	2,266
"C"	142,980	1,459
"D"	none	
TOTAL	1,379,484	14,076

Approximate tonnage: 29.48 per day.

To fly gasoline via the air line over the "Hump" across the Himalayas from India to China, cost as high as $28.00 a gallon.

(From a news report)

Personnel Management in the Army Air Forces

MAJOR DUWARD L. CROW, *Air Corps*

ONCE through with its tremendous expansion and geared to wartime operations, the Air Forces was confronted with the problem of constantly reviewing its organization to insure the most economical and effective utilization of available manpower. The management of personnel had, of necessity, been on a day-to-day basis within individual units and commands. There was no clearly crystallized and defined management program, and each unit and command pursued individual personnel management policies with no means of exchanging effective management practices.

Realizing the vital need for a uniform program, the Air Forces began to study the existing practices within commands, and turned to business and industry as a source of program ideas. It found that business and industry long ago discovered that the productivity of individuals depended largely on the manner in which they were handled. It learned that capable individuals improperly handled can be nonproductive, and that less capable individuals properly handled can be made productive. It found that some supervisors with the same number of personnel and under the same conditions produced much greater results than others. It studied all phases of personnel relationships and the intangible factors that produce good morale and organizational pride which result in increased productivity. It consolidated its findings and formulated them into a program that became the personnel management program for the Army Air Forces.

The program itself was formally inaugurated with the publication of AAF Regulation 37-1 in August 1944. This regulation set forth the mission and scope of the program, and outlined the principles of personnel management. It made commanders of all units aware of management principles within their units and stimulated a questioning attitude among them. It made them look into their units to see what they had done in the past, to see what they were doing now, and to see what they could do in the future. It made them aware of the personnel in their commands as individuals, with individual desires, with individual hopes and ambitions, and with individual capacities to produce. It emphasized to them that the greatest results could be obtained from their units by obtaining the greatest results from each individual in their units.

With the commanders and personnel made aware of the program, it was necessary to explain to them fully, to tell them how it could be applied, to give them practical examples of actual application, and to further their realization of the necessity of maintaining a continuous program. This was effected by the distribution of AAF Manual 37-2. The Manual was keynoted by DO MORE WITH LESS. It showed the effective organization accomplishing its mission with a minimum of personnel, all employed efficiently on essential tasks. It showed the method of attaining this objective in careful step-by-step analysis. It first looked at the jobs, then found men to fit the jobs. It studied these men individually on the jobs, kept them on the jobs, made them like the jobs, made them do the jobs better, and made sure there was no waste time on the jobs. Its logically developed steps are shown below:

1. Get the Right Man on the Right Job
2. Increase His Availability For Work
3. Stimulate His Will to Work
4. Increase His Capacity to Produce
5. Use Him Fully on Essential Tasks

Each step was carefully analyzed and its application shown. GET THE RIGHT MAN ON THE RIGHT JOB—The Air Forces had developed an extensive classification system. It had a number, the Military Occupational Specialty number, for each job and each man was assigned one of these numbers. The "right man on the right job" was the man with the qualifications for the number specialty he carried in a position where that

specialty was required. It was no simple matter. On every hand one can still hear of the malassignments—of cooks that turned up as mechanics, of lawyers assigned as military police, and of cashiers as hospital orderlies. It was necessary to maintain a continual review of job assignments to place personnel in the positions they knew. Often there were more personnel of one specialty than were required and they were performing jobs with which they were not entirely familiar, but an objective had been set—GET THE RIGHT MAN ON THE RIGHT JOB.

INCREASE HIS AVAILABILITY FOR WORK—The right man on the right job was of little value unless he was physically present for full working days. Absenteeism meant lost production. It had to be controlled. A survey showed that illness and accidents were the chief causes of absenteeism. The Air Surgeon had developed preventive medical and dental care and encouraged physical training. These health guards materially reduced absenteeism from illness. Accidents posed another problem. Again consulting industry, the Air Forces learned that safety programs reduced accidents and their resulting absenteeism. An intensive ground safety program was initiated, and from May 1944 to July 1945 accidental injuries to military personnel were reduced forty-seven per cent and injuries to civilian personnel sixty-six per cent. The Air Forces was INCREASING HIS AVAILABILITY FOR WORK.

The right man available for work on the right job needed more. He needed an incentive—STIMULATE HIS WILL TO WORK. The information and education officer told him what he was working for. The special services officer offered him recreation. The chaplain listened to his worries. The personal affairs officer untangled his personal affairs. His supervisor praised his work "well done" and encouraged him when he lagged. His commanding officer was always on hand for consultation, and awarded him for outstanding services, promoted him when he deserved it, and tided him through personal difficulties. He lived in a clean atmosphere; his personal worries were taken care of; he had a chance to get ahead, he had the WILL TO WORK.

INCREASE HIS CAPACITY TO PRODUCE—The willing worker on the job for which he was qualified was a valuable asset. This same worker with added training was a greater asset. On-the-job training gave him an opportunity to increase his skill. Upgrade training gave him a chance for a better job with increased skill. Supervisory training produced better supervisors and foremen and through them, better workmen, and increased production. At one Air Force station one phase of a supervisory training course required each supervisor to submit at least one improvement for his job. In four months this station saved 99,850 man-hours and an estimated $1,450,000. Other stations followed this example. A station had experienced difficulty in securing replacements for key personnel. It solved this simply by an intensive understudy training program. Everywhere original thinking and creative ideas for training were encouraged. To do more with less—to increase individual capacity through training, through new methods—became the motto of many Air Force sections.

The last step—USE HIM FULLY ON ESSENTIAL TASKS—is the logical culmination of the first four. The first four steps are aimed to create a finished product. The fifth step utilizes this product. A highly trained individual should no more be used for a menial job than a high powered crane to lift a five-pound weight. To accomplish proper utilization, the program stressed the necessity for continual review of work-loads, job assignments, and proper scheduling. It outlined methods to prevent loss of man-hours. A system of work-hour reports initiated in February 1945 called the attention of all echelons of command to lost man-hours, and in the sixteen-week period covered by the reports a monthly saving of approximately 1,781,048 man-hours was effected. Everywhere operating personnel were urged to check man-hours against production—to

use every available man-hour at its top skill. The Air Forces had the personnel management objective—the right man on the right job, present on the job; eager to work; and trained to capacity—USED FULLY ON ESSENTIAL TASKS.

With the program outlined and disseminated through the Air Forces, it was necessary to sell it whole-heartedly to participating personnel. In reality, the program was nothing new. It was just a name for something every commander and every supervisor had practiced to varying degrees. It was these best practices combined into an Air Force-wide program and named "Personnel Management." The term itself seemed to frighten some people, but when told that it simply meant putting the right men on the right jobs and keeping them there, they exclaimed, "Why we've done that all along!" But when asked—How did they know they had the right men in the right jobs? What did they do to keep them there? What did they do to prevent work interference? What did they do to increase production?—they began to look around. They began to ask questions themselves. They became advocates of the Personnel Management Program.

To stimulate the program, to be sure the proper personnel realized its aim, and to disseminate its best practices, the Air Forces set up a Personnel Management School. Its students were the key operating officials of the Air Forces. They were chiefs of maintenance and supply, chiefs of personnel and administration, deputy base commanders—they were the people that used people. They arrived at the school, sometimes enthusiastic, but more often skeptical. They had not become accustomed to the belated name for old practice, and they were sure they knew how to use people. The school accepted their skepticism. Its instructors were vigorous young officers sold on new ideas to apply to old practices. They sold their students. In ten brief days of instruction they made converts.

These students, eleven hundred of them in the school's first year, were in some degree the users of practically every individual working for the Air Forces—officers, enlisted men, WAC's, and civilians. They went back to their stations to apply what they had learned. They often met opposition and were often impatient that others could not see the immediate value of their program. But they all contributed something. They aroused interest and stimulated a questioning attitude in management. They all worked for the goal of attaining the maximum utilization of every individual in the Air Forces.

With the program functioning throughout the Air Forces, it was felt desirable to establish some medium for exchange between units and commands of practical ideas and suggestions for the improvement of personnel management. An informal digest served this purpose. It was a compilation of ideas and suggestions effected at stations which resulted in the better utilization of personnel. A new work method, a time-saving device, anything for the improvement of operation developed by one unit was passed on to all units. A suggestion for a new type of flexible nut remover tool submitted by two civilian employees at George Field, Illinois, saved 960 man-hours and $864.00 annually at that field alone. The idea was sent to all stations by the digest. A coffee and doughnut truck at one station eliminated many lengthy visits to the coffee bar and saved vital man-hours. The digest told other stations of the idea and the savings were multiplied many times. The total savings of the entire suggestion program in which the digest played a part were tremendous. The civilian program from 2 June 1943 through 31 December 1945 provided 15,557 new ideas and methods which saved the Air Forces an estimated $57,313,687.50. The military suggestion program from 1 June 1944 through 31 December 1945 furnished 1,552 additional ideas which saved an added estimated $1,757,716.19.

The Personnel Management Program is now well into its second year of operation. It is still something of a stepchild. Too many people have viewed it with skepticism and

failed to realize that its sole purpose is to assist them with old practices and to implement these practices with new ones. But it has made much progress. It has enthusiastic supporters in every unit and command. It has school graduates who are indoctrinating their associates with sound management principles. It has saved the Air Forces untold thousands of man-hours and thousands of dollars in actual cash expenditures. It is gaining a new place of importance in the Air Forces where, under close public scrutiny, *economy and efficiency* are becoming more and more the keynotes of operation.

AIR POWER AND AIR FORCE

Air power includes a nation's ability to deliver cargo, people, destructive missiles and war-making potential through the air to a desired destination to accomplish a desired purpose.

Air power is not composed alone of the war-making components of aviation. It is the total aviation activity—civilian and military, commercial and private, potential as well as existing.

An air force is always verging on obsolescence, and in time of peace its size and replacement rate will always be inadequate to meet the full demands of war. Military air power should therefore be measured to a large extent by the ability of the existing air force to absorb in time of emergency the increase required by war together with new ideas and techniques.

National safety would be endangered by an air force whose doctrines and techniques are tied solely to the equipment and processes of the moment. Present equipment is but a step in progress, and any air force which does not keep its doctrine ahead of its equipment, and its vision far into the future, can only delude the nation into a false sense of security.

Our concept of the implements of air power should not be confined to manned vehicles. Controlled or directed robots will be of increasing importance, and although they probably will never preclude some form of human guidance, reliance upon direct manual skills in pilotage will gradually decrease.

General of the Army Henry H. Arnold

The Role of Military Justice in Attaining Combat Effectiveness

LIEUTENANT COLONEL W. H. ELLSWORTH, *Judge Advocate General's Department*
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AN army is a unique complete social organism in which the grocer becomes the quartermaster, the banker the finance officer, the policeman the provost marshal and the judiciary the judge advocate. In a garrison situation the role of each is traditional and not unlike that of his civilian counterpart.

An army exists only for the purpose of defeating the enemy in battle. In the fulfillment of that objective the role of the general staff is apparent and universally understood. The role of the special staff, particularly the role of those technicians occupied with personnel problems, is obscure and too often misunderstood. When the garrison situation ends and combat with the enemy begins these functionaries are carried along to fulfill their admittedly necessary traditional duties, but they are viewed as (and too often are) protrusions on the streamlined body of the war machine.

This negative viewpoint is unfortunate, for each can make a positive contribution toward defeat of the enemy. This is particularly true of a division judge advocate, whose traditional role of causing punishment to be imposed on wrongdoers—that is, the traditional type of garrison wrongdoers—becomes almost vestigial in time of combat. A well disciplined, hard-hitting division will encounter very few thieves, rapists, drunks and ordinary absentees. Conversely, a fighting division with difficult missions will have an incidence of "combat offenses" (desertion, misbehavior before the enemy, willful disobedience) in direct proportion to the degree with which the difficulty of its tasks "separates the men from the boys."

In coping with combat offenses the division judge advocate may, and must go beyond the negative contribution of imposing punishment upon those who offend. He must formulate and implement policies designed to keep men from offending. His duty to his commander in time of combat is to exercise the technique of punishment in such a way that a maximum number of fighting men are at their posts.

The great majority of soldiers will keep fighting in spite of fear or cold or mud or overwhelming fatigue because they are motivated by self-respect, by a desire for the respect of their fellow soldiers and their home community, or by patriotism. The thoughtful functioning of the special service officer, the postal officer, the chaplain, the surgeon and, particularly, the soldier's immediate commanding officer, is sufficient to sustain the normal, well-motivated American in combat. But there is an alarmingly large number of soldiers, due probably to parental pampering and the ostrich brand of pacifism prevalent during the past twenty years, who stay in combat, only because of the fear that the probable results of deserting are worse than the possible results of fighting. These soldiers are the particular concern of the division judge advocate, as much because they are potentially rotten apples contaminating the rest of the barrel, as because his commander sorely needs their effective services.

The problem is to keep this category of men fighting. The solution immediately apparent, of course, is to impose upon offenders a punishment so drastic, so final and so certain that the rigors, hazards and horrors of front line combat are preferable to potential offenders by comparison. Military justice officers who have not worked with combat troops are quite often surprised to learn that only one punishment—the death sentence—meets these tests when the offender or potential offender is lacking in normal social motivations. To such soldiers the safe haven of a comfortable stockade in the rear is infinitely preferable to combat, and they are not particularly concerned with whether the period of confinement is for five years or for life. I know of some instances

in which combat offenders have insisted that their defense counsel suppress defense evidence for fear it would result in their restoration to duty.

Unfortunately for combat effectiveness, but fortunately for our system of civilization, the universal imposition of the death sentence for certain combat offenses is not practical, though authorized by law. It is only rarely that a court composed of American officers, with the principles of fair play bred into them, will unanimously agree that a combat offense is so heinous as to warrant the supreme penalty. It is only rarely that an offender will come to court with a record devoid of all mitigating factors. Almost all offenders bring to the court's attention some real or fancied wrong or disability which to them is ample justification for their offenses. The pre-trial neuropsychiatric report, which includes a personality assay, almost always reveals some mitigating social or intellectual defect, if not an actual, but not disabling mental defect. Right or wrong it is a rare case, therefore, when a military court can be expected to impose a death sentence. Even when a court imposes the death sentence, it is understandably rare for a Theater Commander to find the offense so aggravated and the offender so worthless that he will heavy-handedly write the signature that sends a soldier before a firing squad. The American regard for human life is so high that it is difficult for us to behave otherwise, even though our military effectiveness may suffer for the lack.

Then how shall the combat judge advocate fulfill his tactical mission of keeping the troops fighting? There are two principal approaches. One approach is to portray graphically the effects of the two remaining punishments, dishonorable discharge and confinement, in the hope that they, like the death sentence, will appear less attractive than combat. The other approach is to endeavor to remove the offender or potential offender from the class of men who are motivated only by fear of punishment to the class of men who have adequate social motivations.

The first approach has been rendered almost wholly ineffective by existing policies. The dissemination of information that is only half true, or which the soldiers think is only half true, does not frighten any of them. We can dramatically explain that soldiers dishonorably discharged for desertion lose their rights of citizenship, that soldiers dishonorably discharged lose their statutory rights as veterans, and that a dishonorable discharge brings disgrace upon a man's family and makes job-finding difficult. If the soldier knows that a majority of the dishonorable discharges for combat offenses are suspended either by the reviewing authority or by higher disciplinary authorities, these exhortations go in one ear and out the other. Most soldiers believe, furthermore, that more dishonorable discharges are suspended than is actually the case, and, of course, it is their firm opinion that the dishonorable discharge would not be executed should they themselves receive one.

Similarly, we can paint a vivid picture of life in a prison or disciplinary barracks and portray a weakened old man emerging from his cell in later life to face the world without family or job. But every rifleman knows of convicted deserters who have been restored to duty within six months after receiving long confinement sentences. The soldiers, as well as the officers who comprise the courts, generalize from their knowledge of these instances and believe that virtually every deserter is released after a short period of confinement. I have seen an accused emerge from a courtroom where he should have been staggered by announcement of a life sentence, smiling quite broadly (because it was not a death sentence) and jokingly remark to his defense counsel that he, the accused, would be a free civilian before the defense counsel was. He meant it; and it was not an isolated instance.

The problem has its origins in the confinement policies pursued after the last war. Whether actually true or not, almost all men and officers believe that there was a wholesale opening of prison gates shortly after

the war ended. They confidently, or cynically, as the case may be, expect a repetition at the end of this war. Deserters fortunate enough to have been raised in the American tradition simply will not believe that a kind and forgiving nation will allow them to remain imprisoned for any length of time after peace has returned.

The problem has been heightened in this war by a rehabilitation program which looks to the salvage and utilization in combat of redeemable men. Based as it is upon pressing manpower needs and upon a commendable effort to rehabilitate individuals, the rehabilitation program probably is not subject to criticism when its role in the entire army is considered. From the viewpoint of one combat unit, however, it has been unfortunate. No doubt unintentionally, it has actually weakened irreparably the only two weapons of deterrence (the dishonorable discharge and a long period of confinement) practically available to a combat judge advocate. The greater the number of convicted men restored to duty, the less potential offenders are deterred. Lacking the fear of court-martial, the number of offenders increases. The resulting increase in trials spurs the disciplinary training center to restore more men to duty. It is a vicious circle. It would be preferable from the viewpoint of the combat unit to insure that all combat offenders would remain in confinement for at least five years after the war. But such a policy would solve the manpower problem only to the extent that potential offenders were deterred, and there is no certainty that the number would be as great as those rehabilitated under the existing program. Which course is preferable depends upon which philosophy or criminology best furthers the entire war effort, and the viewpoint of a combat unit is too limited to venture an opinion.

If trial by general court-martial is reduced from a weapon of deterrence to a mere method of punishment, the role of military justice in maintaining combat effectiveness is greatly hampered. But, in conjunction with the neuropsychiatrist, the surgeon, the chaplain and, principally, the unit adjutants, the combat judge advocate, by employing a non-judicial approach, can materially assist his commander in keeping the men at their posts. To state it differently—if the rehabilitation program weakens the effectiveness of courts-martial, efforts to rehabilitate without courts-martial, should be undertaken. In such a program great success has been achieved.

A division rehabilitation program, though non-judicial, focuses around the division judge advocate because it is he who, under the provisions of Article of War 70, must advise the commander whether an individual should be brought to trial before a general court-martial. In making that recommendation, if he will make himself part psychiatrist, part psychologist and part father-confessor, he can serve effectively. The experience of the 3d Infantry Division in carrying out its own rehabilitation program has progressed through several stages.

When the Anzio beachhead in Italy was first established some men deserted prior to embarkation, others stowed away on returning ships and were later apprehended in the Naples area. From his office in the Naples area the division judge advocate screened the offenders and, from their records and the degree of their offenses, selected certain men, usually a majority of each group apprehended, to be returned to their units for combat duty without trial. The offenders were informed as a group that their serious offenses were not forgiven, but that their future performance in combat would determine the ultimate punishment for the offense. They were told that while a man is performing adequately in combat he would not be tried by general court-martial; implying thereby that good conduct would earn a special court-martial. They were told that future exceptional valor would result in forgiveness. Some effort was made to point up the undesirability of a dishonorable discharge or lengthy confinement. A surprising number, well over half, of the early groups thus salvaged, stuck it out.

The system was modified, later during the beachhead period (five months), to encompass

a lengthy personal interview with the judge advocate in recognition of the fact that some offenders whose offenses looked serious on paper might in fact be salvageable and that some offenders whose offenses looked minor on paper might actually be unredeemable cowards who would refuse to fight further. The number who voluntarily accepted the preferred second chance continued to be high and a majority of the volunteers performed adequately thereafter. First offenders who refused the opportunity were tried promptly. The essence of the plan was to let the man make his own decision after appeals to his pride and patriotism, but in some instances men were returned over their objection in the belief that once with their buddies they would perform. In other instances men were tried despite their request for a second chance in the belief that they would not perform. It is true that a number of the volunteers used the offer as a method of escape. Nevertheless, the system was a success. Although complete figures cannot be compiled, it is believed that in excess of a rifle company was thus salvaged during the beachhead period.

On the beachhead itself, the division neuropsychiatrist found almost laboratory perfect conditions for carrying on a screening and rehabilitation program in conjunction with a second office of the judge advocate established for the trial of offenders there. The perfection of the situation lay in the fact that the entire beachhead was under continuous artillery fire and, except for stowing away, it was impossible to leave. Each offender was sent initially to a "provisional engineer platoon", a unit supervised by the psychiatrist with the assistance of a company officer and appropriate overhead personnel. (The psychiatrist also received psychoneurotic patients who had not offended.) There, under hazardous conditions, the psychiatrist could quite accurately determine which offenders were so unduly affected by the shelling and hazards as to indicate that they had not been legally responsible for their previous offense. By application of psychiatric technique the psychiatrist also endeavored to inculcate adequate motivations into those whom he deemed salvageable. After a sufficient period of interview and observation, varying from two days to two weeks, and during which time the men performed manual labor, the psychiatrist restored them to duty, evacuated them medically or dispatched them to a holdover stockade to await trial.

In subsequent campaigns the program was modified to retain a sufficient psychiatric examination (with automatic medical evacuation, if warranted) but the active rehabilitation efforts previously undertaken by the judge advocate and psychiatrist fell to the regimental adjutants who operated "work platoons" at each regimental headquarters. As at Anzio, offenders were held in the work platoons until it was determined that they were unsalvageable or until they voluntarily returned to combat. The number of men salvaged continued to be satisfactory.

The net result of the rehabilitation program had been to bring before a general court-martial only those offenders who, despite exhortations, refuse to fight and those offenders whose offenses were so aggravated and whose character was so poor that to restore them to duty would have prejudiced the morale of good soldiers. It might be thought that the program would provoke a deluge of offenders who would capitalize on the prospect of one "free desertion" and thereafter do their job. Strangely enough no such instance has ever been shown, and it is believed they are negligible. On the other hand, the system would function much better if, after all feasible attempts to make a good soldier out of an offender had failed, he could be tried by general court-martial with the certainty that he would be dishonorably discharged and confined for a lengthy period of time after the war.

One offender who was spared trial by general court-martial (for a non-combat offense, it is true) won a Congressional Medal of Honor. Another has an oak leaf cluster on his Silver Star. Many have been killed or wounded in honorable action after restoration to duty. These results have justified the program.

General Methods of Instruction in the Command and General Staff School

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This article was written prior to the change whereby the Command and General Staff School became the Command and Staff College, but since there have been no fundamental changes in the subject matter with which the article deals, it is being published as originally presented by the author.—THE EDITOR.

DURING the five years of war-time classes the faculty of the Command and General Staff School evolved certain adaptations of the generally accepted methods of instruction. These adaptations arose from certain instructional problems peculiar to the intensive courses conducted at the school during this period.

It has been said that the dawn of history occurred when the first man attempted to instruct his companions. Since then there has been no cessation in the quest for the one best method of instruction. King Ptolemy I of Egypt, about 300 BC, is credited with having asked the Greek mathematician, Euclid, if there was not some easier way to learn geometry than by studying Euclid's textbook, the "Elements." The Greek's reply is still classic—"There is no royal road to geometry."

Education, like all other good things, must be bought with a price. The price is painstaking and persistent effort. Yet the conviction that this effort be not dull and meaningless, is the driving force behind the quest for method.

For several centuries now, educators the world over have been seeking for a vital approach to learning the instruction. The "sense realists" thought they had it in the inductive approach, making liberal use of objects and pictures; Rousseau, the French master, thought he had it by letting nature and native curiosity do the work, with a tutor in the background; Pestalozzi, the Swiss, thought he had it in psychologizing education; our "progressives," so-called, think they have it in following the spontaneous interests of the student. Only a few years ago some thought the secret was revealed in the socialized recitation; this was rapidly superseded by the project method; which in turn, has given way to activity programs.

Each of these schools of thought is busily expounding, developing and defending its particular theory of education. Between some of these are mere differences in technique or terminology; between others are wide gulfs of psychology and procedure.

The practitioners of all of these schools, that is to say the instructors, are in substantial agreement about the fundamental processes of instruction, namely, the lecture, the conference or seminar, the exercise, the demonstration, the review, the practical application and the test.

So that we may approach our main subject from the same viewpoint, each of these processes should be defined in general terms.

The *Lecture* is a discourse delivered on any subject, especially a formal or methodical discourse intended for instruction. It normally involves no participation on the part of the student other than attentiveness.

The *Conference or Seminar* is a meeting between individuals, in our case between the instructor and students, for the purpose of consultation, discussion or interchange of ideas.

The *Exercise* is that portion of the curriculum which gives the student practice in the subject matter under consideration. The Exercise constitutes a trial or test of the information presented to the student.

By *Demonstration* is taken to mean any explanation by the instructor of apparatus, principles, or processes which is accompanied by a concrete exhibition.

The *Review* normally is part of the conference or exercise in that questions and discussions are oriented so as to provide a reiteration of principles already presented. On the other hand, the review may take the form of a complete conference or exercise designed solely for that purpose.

The *Practical Application* provides the student with the opportunity of using on a practical problem the principles he is being taught.

The *Test* provides the instructor with the means of determining first, the effectiveness of his presentation; second, which students need additional help, and third, which students should be eliminated from the course.

In passing from the pre-war organization to the accelerated one required by the war program, the Command and General Staff School faced the necessity for increasing the effectiveness of its instruction, for preserving a close instructor-student contact, and for insuring that the doctrine and principles it enunciated should be kept abreast or ahead of rapidly changing concepts and developments in the field. These were tasks of the first magnitude. The ratio of instructors to students, which was one to five in 1939, decreased to one to ten. From the field, came volumes of reports, surveys and observations, all of which were pertinent to instruction in this school. These instructional problems were met in part by the development of new instructional aids, and in part by special adaptations of these fundamental instructional methods we have just been discussing.

Before describing these adaptations, the mission and objectives of this school should be stated. The mission is to impart to the student officer a knowledge of staff techniques and procedures which will enable him to step confidently into a position as an assistant general staff officer. The objectives are threefold; first, to give the student a foundation of basic detail; second, to give him practice in the application of these details through the medium of applicatory staff problems based on map situations which simulate actual field experience; and third, to stimulate independent thinking which will enable the student after he is in the field, to build on the foundation received at this School.

The true lecture, as such, finds but a small use in the curriculum. It is confined to a few highly selected guest speakers. No study assignments are given. Normally, no questions are asked from the platform and it is the speaker's privilege to decide whether or not he desires to answer questions from the class.

The place taken in the collegiate curriculum by the lecture is filled here by the conference. This conference does not, at first glance, live up to its usual definition of a discussion or interchange of ideas. When, however, one considers the caliber of our student, it becomes evident that the instructor can present more information in a given period of instruction. The natural ability and interest of the student body normally insures its participation. Otherwise such participation is achieved by adroit and skillful use of questions from the platform. The conference is normally employed to present to the class information which is of general background interest (e. g., a conference on the United Nations), or which is in nature of a "refresher" subject (e. g., conferences on the functions of the various technical services), or which is intended to guide the student into the study of information of fundamental importance to the remainder of the course (e. g., a conference on the "Classes of Supply").

Notwithstanding these factors of ability and selectivity within the student body which were just mentioned, there is definite place for the seminar, or consultation between a few students and an instructor. This need is covered by the use of committee work wherein a group of ten to fifteen students sit with an instructor to discuss and solve problems relating to and developing the principles under discussion during that phase of the course. This device is of particular value when there may be a number of satisfactory, though varying, solutions to a

certain staff problem (e. g., the development of a naval gunfire support plan for an amphibious assault).

In any course reiteration and review are essential factors parallel in importance to the initial presentation of the subject matter. In the Command and General Staff School course, reiteration, pure and simple, finds no available time. Review, therefore, must be doubly effective. This instructional problem is solved by the use of tutorial reviews. In a tutorial review a group of students, comparable in size to those assigned to committees, meets with an instructor and proceeds through a thorough review of the principles of staff techniques and procedure involved in the phase of instruction just completed. These are not mere repetitive reviews of detail, but a re-emphasis of principles through discussion of a new or continuing military situation. Tutorials do not consist of a series of questions and answers but are group discussions, probing and analyzing the subject in light of the experiences of the individuals in the group.

All have heard the expression, "We learn by doing." Even an embryonic general staff officer learns by doing. Therefore the bulk of instruction falls within the classification of an exercise. In an exercise, students perform the operations and practice the techniques of certain staff duties. An exercise is usually controlled by one instructor and limits itself to one phase of staff work, G/A-1, 2, 3 or 4. For example, in one exercise the form and technique of writing an administrative order is discussed. Then the student is given an administrative plan and is required to prepare the administrative order to execute the plan.

Even more extensively, map exercises are used. After a military situation, usually involving a series of staff problems, has been presented on a map and developed in detail by a group of instructors, the student is given a requirement representing some phase of the development of the problem, which he, as a general staff officer, would have to execute. Normally, this would be the preparation of some staff paper such as an estimate, fragmentary order, plan, or the like. As the map exercise progresses, questions are asked by the instructor and a discussion conducted on the staff principles under consideration. Recall the second of our three objectives; namely, to give the student practice in the application of these basic details through the medium of applicatory staff problems based on map situations which simulate actual field experience. It is evident from the brief description of map exercises just given that these must be the backbone of the instruction at the school.

The principle employment of the demonstration in the courses follows the form of dramatized skits or plays. In these, several instructors act out the performance of a typical staff in a given situation. Technically, the stationary exhibits of weapons, types of rations, etc., as well as certain of the motion pictures shown, can be classified as demonstrations.

Actual field tests with troops constitute the desirable practical application. It is self-evident that here at the Command and General Staff School a substitute must be used. The answer is—map maneuvers. These are the principal means of instruction in the operational phases of staff duties. The map maneuver is a military operation, with opposing sides, conducted on a map. Troops and military establishments are represented by symbols or markers which are moved to represent the maneuvering of troops on the ground. Students are assigned positions as staff officers while instructors act as commanders. The student staff officer is required to perform the necessary staff duties and execute the necessary staff papers to accomplish the mission assigned his commander.

There are no tests conducted during the course at the Command and General Staff School for that sole purpose. Certain of the written requirements, which are completed by the students and which are integral parts of the exercise and map exercises, are graded to furnish sufficient data to determine the instructional effectiveness of the faculty. Secondarily, these marked requirements do

occasionally indicate a student who is in need of assistance. In a few exceptional cases, a student's grades on these marked requirements indicate that he should not have been selected to attend this School.

In his General Order directing the establishment of this School in 1881, General William T. Sherman, Civil War hero, then Chief of Staff, stated that it was to be a "School of Application." The principle of "Application" has been the focus of our instruction ever since.

Applicatory work is based primarily upon a practical problem or series of such problems which students are required to solve. Instruction is achieved through student participation in the solution of these problems; the prime effort being made to develop the student's ability to use the principles studied in reaching a satisfactory solution to the problems under the conditions stated. The mastery of factual knowledge becomes of secondary importance. The methods and aims of our instruction are somewhat comparable to those in a progressive laboratory class. The objective is to develop the student's ability to use the principles being studied in the solution of actual problems that will be encountered outside the laboratory, rather than the mere memorization of formulae. Under this concept of instruction, the test of any student solution to one of our requirements is the answer to the question, "Will it work?" Hence, in the last analysis, success of instruction in the School is measured by the extent that its graduates are able to make application of the principles offered at Leavenworth in the solution of actual problems encountered later in the service.

Returning from France after the last war, with General Pershing, I participated in his endeavors to persuade the Nation to establish and maintain a sound defense policy. Had his recommendations been accepted, they might have saved this country the hundreds of billions of dollars and the more than a million casualties it has cost us again to restore the peace. We might even have been spared this present world tragedy. General Pershing was asked against whom do we prepare. Obviously that question could not be answered specifically until nearly twenty years later when Adolf Hitler led the replenished armies of defeated Germany back into world conflict. Even as late as 1940 I was asked very much the same question before a committee of Congress. Not even then could I say definitely exactly where we might have to fight, but I did recall that in past wars the United States had fought in Latin America, in France, in Belgium, in Germany, in Russia, in Siberia, in Africa, in the Philppines, and in China, but I did not anticipate that in the near future American soldiers would fight in the heart of Burma, and in the islands of the vast Pacific, and would be garrisoning areas across the entire land and water masses of the earth. From this lesson there is no alternative but that this Nation must be prepared to defend its interests against any nation or combination of nations which might sometime feel powerful enough to attempt the settlement of political arguments or gain resources or territory by force of arms.

General of the Army George C. Marshall

The Air-Ground Problem

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THE time has truly come to talk of many things. With the final, complete and utter defeat of the Axis powers by the armed might of the Allies we should now coolly, calmly, without prejudice, and without bias examine the team which accomplished this victory. We must search out the good from the bad, the smooth from the rough, and with imagination and foresight overhaul our team during the years of peace, so that only the good and the smooth remain.

The subject to be examined and discussed is the often maligned problem of air-ground organization and command. Before discussing the problem, we must accept certain principles as self-evident truths.

1. The mission of Land Power is to close with and destroy the enemy on the ground, to occupy the enemy nation, and to impose the terms of the peace upon the defeated peoples.

2. The mission of Air Power is to close with and destroy the enemy in the air, to destroy the enemy's economic ability and will to fight, to support by fire power the Ground and Naval Forces, and to provide air transportation for Ground Forces.

3. The mission of Naval Power is to close with and destroy the enemy on the sea, to transport Ground and Air Forces by sea, and to support by fire power, within the range of naval guns, the Ground Forces.

If we accept the above three missions as correct we must then discard paragraph 1 of FM 100-20 dated 21 July 1943. This paragraph states: "Land Power and Air Power are co-equal and interdependent forces: neither is an auxiliary of the other." Actually all forms of power are auxiliary to other forms of power, none is supreme or complete within itself.

Military power, whether developed by Naval, Ground or Air Forces, is personified by fire power. Fire power developed through the use of explosive energy or more recently the use of atomic energy, has the ultimate purpose of facilitating the advance of the infantry, or foot soldier, to and into the enemies' home country. All means of developing fire power must be coordinated and integrated so as to accomplish this end.

During the recent war, this coordination and integration was achieved through a system of negotiation between co-equal air and ground commanders. In case of a breakdown in the negotiations the problem had to be presented to the theater commander for decision. In so far as is known, recourse to the theater commander was seldom, if ever, necessary. It is believed that this was true because of the full understanding by ground commanders of the proper use of Air Power, and, in those few instances of dispute, the ground commander accepted the air commander's decision rather than upset the fighting team by bickering over rather minor and unessential points. In other words, negotiation was made to work because of the burning desire of all parties to reach one end, the defeat of the enemy.

Now that the necessity for cooperation has been removed the Air Forces and Ground Forces are once again pulling apart. Air Forces are separated from Ground Forces, each is located on his own field or camp, command is centralized only in the War Department, and the bitter argument of "who won the war" is beginning to be heard. The ground soldier is criticizing the sloppy undisciplined air man and the pilot looks down his nose at that poor throwback to an ancient age, the ground soldier. Such a condition must not be permitted to develop. Command and organization must be so integrated that we have only one team which trains and fights as one. We cannot expect two teams which, in peace, bicker and squabble with each other suddenly to become one in the face of the enemy. William Paley once said, "Who can refute a sneer." A sneering attitude of one service for another cannot be tolerated.

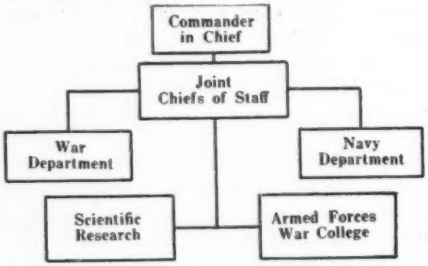
Joint air-ground coordination has been

likened to marriage. Certainly the coordination and cooperation of a married couple cannot be increased or extended by a divorce. How can we then expect a better air-ground team through separation of Air and Ground Forces? The answer lies in strengthening the present marriage and not in divorce.

"Nothing is more important in war than unity of command." *Napoleon, Maxim 46.*

"Infantry, cavalry and artillery cannot do without one another. They should therefore be quartered so as to give mutual aid in case of surprise." *Napoleon, Maxim 47.*

If to the infantry, cavalry and artillery of Maxim 47 we add "and air forces" we will have brought the maxim up to date. It is on the firm foundation of the above two maxims that the following organization and chain of command is based.



The author does not intend to delve into Navy organization other than to say that the need for Naval Air, and Marine units is believed self-evident. Naval Air includes not only all carrier and ship-borne aircraft, but such units of land based aircraft as are necessary to carry out the assigned naval mission.

In connection with Chart 1, the following should be noted. Ground, Service and Air Force units may be assigned to any command or major unit of any of the three forces. For instance; Engineer battalions may be assigned to Air or Ground units, Tactical Air Forces may be assigned to Army Groups, Antiaircraft Artillery may be assigned to the Air Defense Command. Overseas commands would be organized in a manner similar to that shown above for the War Department. A Theater Commander would be designated by the Joint Chiefs of Staff with command of all Army and Navy elements assigned to the theater.

Note in Chart 2 that the Tactical Air Force is an organic part of the Army Group. The Engineer Command is responsible for the construction and maintenance of all air fields used by air units, except liaison squadrons, within the Army Group.

In connection with chart 3 the following points are to be noted:

1. The Tactical Air Command is assigned to the Army.

2. A Liaison Reconnaissance Squadron is assigned to each Corps. This squadron, equipped with light aircraft furnishes liaison planes for use within the Corps and is capable of performing close-in detailed reconnaissance. The Corps Engineer is responsible for preparation and maintenance of the fields for this squadron.

3. The Tactical Air Command will maintain with each Corps and Division of the Army an Air Liaison Officer.

4. In addition to providing the Tactical Control Center and the necessary Forward Director Posts (normally one per Corps), the Tactical Control Group will provide one Forward Control Team with each Corps headquarters and infantry division, and four Forward Control Teams with each Armored Division of the Army.

5. The Army Headquarters will provide Ground Liaison Officers at each group of fighter aviation, each squadron and group of reconnaissance aviation and with the Tactical Control Center and each Forward Director Post of the Tactical Air Command.

Let us now look back and see if we have violated the maxims on which the organization was based. We must assume that the Army Group would establish the Tactical Air Force Headquarters with its own headquarters and that the Army Commander would keep the Tactical Air Command with his headquarters.

Unity of Command has been established throughout. Each commander has the forces necessary to carry out his mission. Consid-

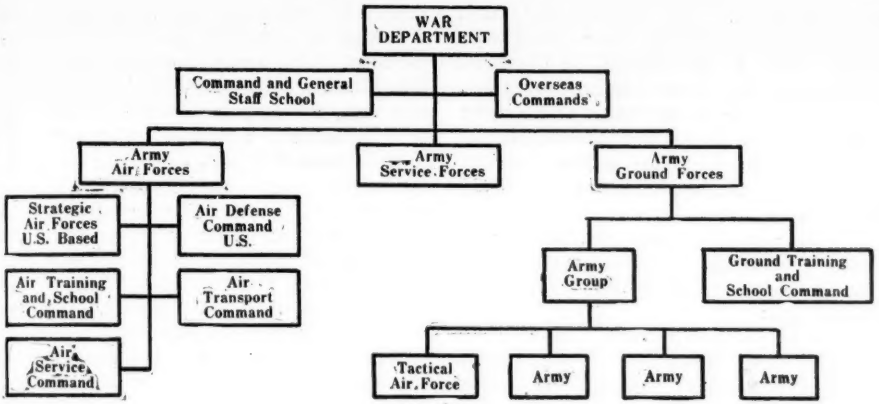


Chart 1

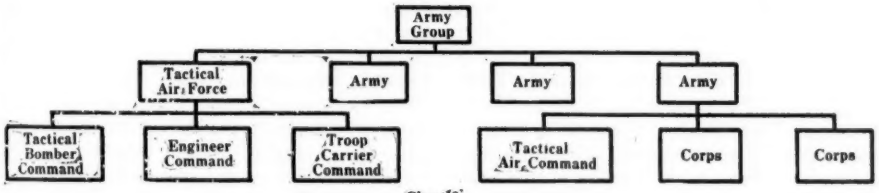


Chart 2

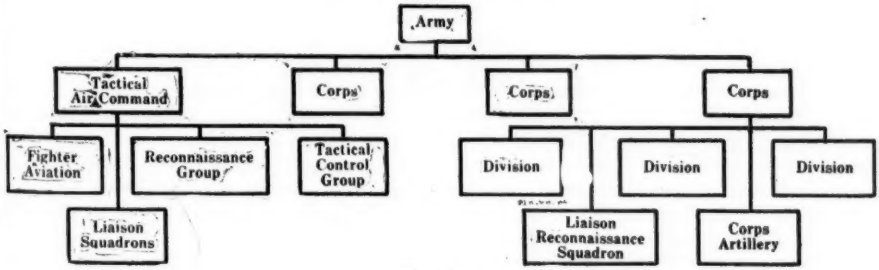


Chart 3.

ering the employment of fire power, we can now truthfully say:

1. The division commander influences the battle through the fire power of the *division artillery.*

2. The corps commander influences the battle through the fire power of the *corps artillery.*

3. The army commander influences the battle through the fire power of the *tactical air command.*

4. The army group commander influences the battle through the fire power of the *tactical air force.*

5. The commander in chief (or theater commander) influences the battle through the fire power of *strategic air forces.*

The only major change from the present organization is the subordination of the Tactical Air Force to the Army Group and of the Tactical Air Command to the Army. This will of course, immediately raise the question of flexibility of air power. Actually a review of the organization reveals that

flexibility of air power remains the same. Instead of the Tactical Air Force Commander issuing orders to the Tactical Air Command Commander, the Army Group Commander issues the orders to the Army Commander. Staff contact is maintained between the air commanders in the same manner as now used between Corps and Division Artillery Commanders.

If we accept the above organization as proper we must then change paragraph 3 of FM 100-20 dated 21 July 1943. This paragraph states:

"Command of Air Power: The inherent flexibility of air power is its greatest asset. This flexibility makes it possible to employ the whole weight of the available air power against selected areas in turn; such concentrated use of the air striking force is a battle winning factor of the first importance. Control of available air power must be centralized and command must be exercised through the air force commander if this inherent flexibility and ability to deliver a decisive blow are to be fully exploited. Therefore, the command of air and ground forces in a theater of operations will be vested in the superior commander charged with the actual conduct of operations in the theater, who will exercise command of air forces through the air force commander and command of ground forces through the ground force commander. The superior commander will not attach army air forces to units of the ground forces under his command except when such ground force units are operating independently or are isolated by distance or lack of communications."

Certain other points, besides organization and chain of command, must be considered in a discussion of the air-ground problem. The most important is probably the one on military education.

Air forces and ground forces each conduct their own branch and service schools. These schools should be basic and cover all phases of the branch or service concerned and include indoctrination instruction on all associated arms. Selected officers would be sent to the Command and Staff College of the War Department. After graduation from this school the officers should be qualified to command any unit, not a general officer's command, or to function as a staff officer on any staff.

The Armed Forces War College would be the senior educational institution of the armed forces. It should be conducted by the Joint Chiefs of Staff. The student body would be composed of selected Army and Navy officers. The graduates of this college would be assigned to the General Staff Corps. From the General Staff Corps would be selected the general officers and admirals and the staff officers for joint Army-Navy staffs.

Another point to be discussed is flying pay. Flying pay has, in the opinion of the author, caused many air officers to stick too close to flying with a resultant retardation of a broadening of all officers. Flight pay was basically provided to cover increased insurance premiums. It no longer does that, but has become a differential in living conditions between flying and non-flying personnel. Flight pay should be eliminated and a fair system of insurance provided for all officers involved in extremely hazardous duty. This might well take the form of a certain amount of free insurance, if the insured carries a basic insurance at his own expense, and a provision whereby the government would pay the difference in premium on any other insurance where the increased premium is due to assigned hazardous duty.

A third point of discussion is the matter of flight training. An understanding of the air man's difficulty is best realized by flying. All officers regardless of arm or service or grade should be encouraged to learn to fly. Any officer who is capable of flying should have the opportunity to learn and should be permitted and encouraged to wear wings. When every general officer and every regimental and battalion commander has sprouted wings, then we will no longer have an air-ground problem.

The Assistant Division Commander

Extract from a letter from MAJOR GENERAL P. W. CLARKSON, Commanding General, 33d Infantry Division

WHEN I was in the Division as Chief of Staff, the division was triangularized. The Assistant Division Commander just assigned set himself up as "Commander of Infantry" using the Reconnaissance Troop as an Infantry Headquarters Troop. This did not suit the Division Commander and I was asked to draw up a draft of a letter of instructions to the Assistant Division Commander outlining his duties. My letter was materially revised by the Division Commander and was issued to the Assistant.

I then went as Assistant Division Commander to a new division. The Division Commander asked me to outline what I considered my duties should be. I revamped the instructions from the previous division and they were issued to me. Then I was sent to activate and command the 87th Infantry Division.

I do not wonder that the question as to what the Assistant Division Commander does is raised, for I never have received a clear answer to the question. However, based on my experience in the two previous divisions, I issued a letter of instructions to the Assistant Division Commander. I used him largely to prepare and conduct the various tests and exercises prescribed in the AGF training program. The Assistant Division Commander being highly intelligent and cooperative and a fine officer in every respect, required no further formal instructions. The letter has been the basis for my instructions later in the 33d Division.

The instructions which necessitated only slight modifications to adjust the situation in the Kyoto-Osaka-Kobe area in Japan are as follows:

HEADQUARTERS 33d INFANTRY DIVISION
Office of the Commanding General
A.P.O. 33

30 September 1945

SUBJECT: Assignment of Duties.
TO : The Assistant Division Commander, 33d Infantry Division.

1. The chain of command within the 33d Infantry Division is direct from the Division Commander to the Commander of the Division Artillery, the Commander of each infantry regiment, and separate unit. The Assistant Division Commander is not in the chain of command.

2. The following duties are assigned to you as the Assistant Division Commander:

a. Supervision of the training and testing of the 123d Infantry, 130th Infantry, and 136th Infantry. This supervision and testing will be conducted in such a manner as will insure complete execution of the provisions contained in various current training directives, memorandums, and adopted standing operating procedures issued by the 33d Infantry Division. You will insure that the field orders and operational directives and instructions issued by the 33d Infantry Division, which pertain to the above units, are fully executed.

b. Supervision of the administration of the units mentioned in *a* above to insure correct and efficient handling, as prescribed in regulations and Division orders. This will include all matters pertaining to supply, care of equipment, property accountability, motor maintenance, use of motor vehicles, audit of funds, personnel records, discipline, recreational activities, immunization of personnel, condition of quarters, messing arrangements, wearing of the uniform, military courtesy, and police of areas. You will institute systematic checks and inspections to insure proper standards.

c. Supervision of the 33d Cavalry Reconnaissance Troop as set forth for the Infantry Regiments in sub-paragraphs *a* and *b* above.

3. Any or all of the above duties with respect to other units in the Division may be temporarily assigned to you from time to time.

4. You and the personnel which constitutes your office are an integral part of Division Headquarters. The General and Special Staffs of Division Headquarters will prepare necessary plans and orders to be issued regarding the training, administration, supply, and tactical operations of all units within the division. It is desired that you consult with the Division General and Special Staffs in connection with orders and instructions pertaining to the units assigned to you for supervision.

5. Your office is not an office of record. The records and files of Division Headquarters are available to you.

In the 87th Division, a new division, where there were continually tests and exercises to be conducted, I had more for the Assistant to do than he could handle. Actually, he was doing G-3 work. As Major General Fred Walker in the 36th Division said, "If the Assistant Division Commander would consider himself as an Assistant G-3, it would be perfect."

During the operations against Baguio on Northern Luzon, for the first time during my command, the Assistant Division Commander was with the Division. I used him to check up on infantry operations and as my personal representative with the front-line infantry at the point where there was the most activity. This use of the Assistant Division Commander was in line with my letter of instructions.

I consider that the Assistant Division Commander is more or less a "fifth wheel" and has no cut-and-dried job in an Infantry Division. It is always somewhat of a problem to know what to use him for and at the same time keep him out of the regimental commanders' hair.

He is, of course, available, if he is second in command, to take over during the temporary absence of the Division Commander. However, in my experience he has never been second in command, the Division Artillery Commander being the senior, and in every case where I have requested that he be designated second in command, the request has been disapproved by higher authority.

A brief outline of how I believe the higher command and staff in an infantry division should be set up, follows:

Major General	Division Commander
Brigadier General	Second in command and Chief of Staff
Colonel	Chief of Operations Section, General Staff (including G-2 and G-3)
Colonel	Chief of Administrative Section, General Staff (including G-1 and G-4)
Brigadier General	Regimental Commander and, when necessary, RCT Commander
Brigadier General	Division Artillery Commander

Strategy is the art of making use of time and space. In war the game is always with him who commits the fewest blunders.

Napoleon

The Evolution of Military Intelligence

Extracted from Documents

Introduction: The Appreciation of Military Intelligence

EVER since men began to practice the art of warfare they have appreciated the desirability of acquiring information about the strength, movements, and plans of their opponents and about the country in which the fighting would take place, and of denying information about their own forces to the enemy. The maxim, "Other things being equal, victory goes to the commander with the best and latest information," is, in one form or another, among the oldest of writings about the art of war.

The force of the maxim was probably understood by all successful warlike tribes long before writing was ever used. Before a band of forest Indians took the warpath, their chiefs sent the most daring and cunning of their young braves to spy out the land selected: to learn the state of trails and rivers, and the location of hostile villages and encampments, to discover the numbers of the enemy's fighting men and what weapons they had, and whether they were assembled for war or scattered in peaceful pursuits. All the lore acquired in the unit, all the skill in reading trails and forest signs thus found its wartime use. Most of the frequent successes of the Indians against the better armed, better disciplined, and more numerous white men were due chiefly to the superiority of the Indians' primitive forest system of intelligence.

Egyptian and Assyrian inscriptions and the record of the Bible show that the first civilized men also realized that information was among the most potent weapons in the arsenal of war. One of the earliest dynastic inscriptions records the observations of Pharoah's spies in the land of Punt, and long before Joshua sent men to spy out the land of Canaan, the Egyptian government was receiving regular intelligence reports from its agents beyond Jordan. The Persians, as Herodotus records, used their ambassadors as spies. Marius defeated the Cimbri, just as later Julius Caesar outmaneuvered and destroyed the Helvetii, because he had accurate advance information of their strength, their movements, and their plans.

Military Intelligence in Ancient India: Kautalya

What was found valuable in practice was embodied in the first systematic treatise on the theory of war, and the point was so clear that the statements of 2000 years ago can hardly be improved. A Sanskrit book of advice to rulers, written during the Maurya Empire in India, sometime in the Third Century, BC, reads in part almost as if it were a manual of military intelligence for the Nazis. Kautalya, the traditional author, emphasizes again and again that a highly organized intelligence service is essential to the security and expansion of the state, a primary consideration in peace and war. He divides the king's army into five arms: elephants, chariots, horsemen, archers, and spies; and of these, spies, he declares are the most important, for attack or for defense, as sagacity (skill in intrigue) is more important than enthusiasm or strength, "For he who is skillful, by spies and by strategy, will often succeed in overreaching more powerful enemies."

"He who would be a conqueror," says Kautalya, "must first know the comparative strength and weakness of himself and the enemy." And he goes on to recommend that no war be undertaken without a careful examination of all the factors in the situation as reported by the king's spies. The broad headings of Kautalya's outline for this preliminary estimate of the situation could serve a modern general staff. He insists that not only must the enemy's military strength be examined in detail, his numbers and equipment, the morale of his troops, the temperament of his commanders, and his customary tactics, but the terrain and weather for the campaign must be carefully

considered, as well as the enemy's total resources, his possible allies, and the loyalty or dissention of his people. Only when these things are known can it be decided what forces are required for victory. In raising an army, Kautalya repeats, one should always reflect, "Such is the army of the enemy, and this is my army to oppose it."

In subsequent sections of his discussion, Kautalya has some interesting things to say about the proper combat intelligence service for field armies, but he makes it clear that the chief reliance of his system is on what we should call a fifth column. He recommends spies under a variety of covers, some for information, some to spread political unrest and undermine the enemy's morale, as many as possible to sabotage the enemy's war effort by setting fire to crops, villages, and supply depots, blocking roads, poisoning wells, and assassinating the enemy's political leaders and field commanders. Kautalya's book was apparently a standard manual for the Maurya rulers, and its maxims throw considerable light on the methods by which that remarkable dynasty, with no initial advantage over its neighbors in position or numbers or equipment, was able to conquer and hold the greater part of India.

Ancient China: Sun Tzu

While Kautalya's book was still relatively new in India, a Chinese general, Sun Tzu, wrote a treatise on the art of war so sound that both Generalissimo Chiang Kai-shek and his sometime ally and sometime opponent, the guerrilla general, Chu Teh, used it as a constant guide. Sun Tzu has one illuminating chapter on military spies, but he was more interested in combat intelligence, and what he wrote about the study of terrain, the detection of enemy intentions, of enemy strength from logistic data, and the interrogation of prisoners could be incorporated with few changes into any modern intelligence manual. Sun Tzu writes about tactics as well as about strategy, and he is less concerned than Kautalya with the political aspects of war. He was a practical field commander with responsibilities on a lower echelon. But like Kautalya he gives chief importance to a good intelligence service. "A hundred ounces of silver spent for information," he says, "may save ten thousand spent on war." He states the fundamental reason for maintaining an intelligence service as emphatically as it has even been stated:

"If you know the enemy and know yourself, you need not fear the result of a hundred battles. If you know yourself, but not the enemy, for every victory you will suffer a defeat. If you know neither, you will always be beaten."

Essentially, Greek and Roman military theorists endorsed the substance of this maxim of Sun Tzu. Frontinus illustrates it again and again. Plutarch accepts it as commonplace. Procopius makes it the chief point of most of his military chapters. Only in the weakness, poverty, and stupidity of the middle ages did armies again go into battle blind and ignorant.

The Middle Ages

Chivalric barons to whom war was an aristocratic sport, had only contempt for the use of spies, but even in their day, the professional army of the Byzantine Empire had a highly organized intelligence service, some outlines of which can still be recovered from their military textbooks. The enormous conquests of the Mongols were prepared and guided by their spies, who systematically collected information for campaigns years ahead. One of the notable advantages of the Turks, in the days when they were terrorizing the Western Mediterranean, raiding Italy and hammering on the gates of Vienna, was that Turkish commanders regularly took the trouble to be much better informed than their European adversaries.

The Renaissance: Diplomatic Intelligence

The systematic collection of intelligence began again in Western Europe with the rise of modern states and the organization of modern armies in the Sixteenth Century. The custom of exchanging resident ambassadors between the principal courts of Europe arose largely because the more powerful states began to appreciate the advantages of having

a constant flow of information about the political and diplomatic involvements, the warlike plans, and the military strength of all their possible enemies. In the Seventeenth and Eighteenth Centuries a constantly larger stream of political and military intelligence, collected by spies and by corruption as well as by more official means, flowed from all the embassies into all the chancelleries of Europe, to be more systematically processed and filed, and to form the basis of diplomatic and strategic decisions.

As early as the first quarter of the Seventeenth Century the ambassadors of the major European powers, particularly Spanish diplomats, were already collecting military intelligence, not only by legitimate means, but by all the arts of espionage, bribery, and subversion which have since been employed by the agents of aggressive and unscrupulous powers. Their victims were sometimes indignantly aware of these activities and publicly protested against them, both in official communications and in popular propaganda. The account which Middleton's satire, *A Game of Chess*, 1624, puts in the mouth of Gondomar, the Spanish ambassador at London, might almost serve as a check list of the kinds of military information sought, and usually obtained. Says Gondomar, the villain of the play:

". . . Pray, what use
Put I my summer recreation to,
But more to inform my knowledge in the state
And strength of the White English Kingdom? No fortification
Haven, creek, landing place about the White Coast,
But I got draft and platform; learned the depth
Of all their channels, knowledge of all sands,
Shelves, rocks, and rivers for Invasion properest;
A catalogue of all the navy royal,
The burden of the ships, the brassy murders,
The number of the men, to what cape bound:
Again, for the discovery of the inlands,
Never a shire but the state better know
To me than to her best inhabitants;
What power of men and horse, gentry's revenues,
Who well affected to our side, who ill,
Who neither well nor ill, all the neutrality:
Thirty-eight thousand souls have seduced."

(IV, ii. 41-75)

Gondomar's interest in the details of strategic intelligence needed for amphibious operations has, after more than three centuries, a curiously contemporary sound.

Early Modern Times: Field Intelligence

During this time intelligence was centralized and systematically processed only at the cabinet level. Field commanders received the pertinent parts of this information at the beginning of a campaign, and thereafter, in the matter of intelligence, were left to shift for themselves. Each commander had to create anew, for each occasion, his own intelligence service, and to seek information of the enemy in any way he could. Down to the Napoleonic Wars, although the collection of political intelligence had become highly centralized and required a large organization of specialists, military intelligence remained a haphazard affair. Each field commander improvised his own system, and even when several corps commanders were operating in the same area, against the same enemy, the information they required was separately collected and imperfectly shared. Each general was, in effect, his own intelligence officer and the chief of his own intelligence service.

The greater complexities of modern war, the greater burdens placed upon the commander by the size of the new conscript armies and by the necessity of coordinating the employment of the several arms, and of mutually supporting army corps, the enlarged area of maneuvers and the increased importance of military topography—all these factors had made imperative a better army staff organization, and particularly a better staff intelligence, long before Waterloo. Had Wellington and Bluecher been as well informed as they could easily have been, they would not have been surprised at Ligny and Quatre Bras. Had Napoleon had proper maps of the next day's battlefield, and had his scouts kept proper touch with the Prussians, he would not have failed to exploit to the full the advantages of his surprise.

Intelligence on General Staffs

The armies of Europe were slow to take advantage of the lessons of the Napoleonic Wars, Berthier, Jomini, and Clausewitz all emphasized the importance of what we have since come to call a general staff, and of the

place on that staff of an adequate intelligence section. "Other things being equal, victory goes to the commander with the best and latest information," was a maxim which only had to be stated to be accepted. But the writings of the theorists did not find full expression in practice until Moltke's reorganization of the Prussian General Staff after 1850; and it was not until after the sensational victories of Moltke's system in 1866 and 1870 that other European nations began to follow suit. By 1900, however, intelligence had a place on the same echelon with personnel, operations, and logistics in the staff organization of every major European power, and every power had set up a coordinated military intelligence system designed to function in peace and war. Since World War I, it has been accepted doctrine in the United States Army that intelligence is one of the major staff functions, and a place has been made for intelligence on every echelon of command.

The experience of World War II has greatly reinforced this doctrine, and greatly widened its practical application. Perhaps our Army staff intelligence work, even for the Army Air Force, was never quite up to the best professional German standards. But by 1944 it was not far behind, and its services to command were proving of inestimable value. We may assume that the United States Army will not again allow itself to to fall behind its possible enemies in the matter of military intelligence.

The history of our Army offered no guide to the organization and duties of the general staff under conditions involving the handling of millions of men in a great war. After Congress had created the General Staff in 1903, considerable hostility grew up against it in both Houses. Moreover, there existed no little opposition to it within the Army itself, especially in the entrenched supply departments and bureaus at Washington. A certain limited class of line officers who regarded their commissions as sufficient evidence of superior qualifications and as carrying a vested right to live at the expense of the Government with a minimum of exertion, also decried it. But the main thing that retarded its evolution was the lack by the successive Chiefs of Staff, of a clear conception of its proper functions and the consequent centralization of details in their hands.

General of the Armies John J. Pershing

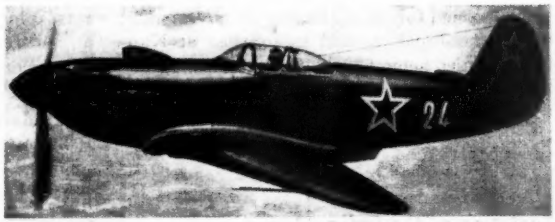
MILITARY NOTES AROUND THE WORLD

U. S. S. R.

A Russian Single-Seat Fighter:

This description of the YAK-3 has been given to us by a French fighter pilot who flew these aircraft on the Russian front.

Cockpit equipment is simple, one of the most noticeable features being the lack of gyroscopic instruments — artificial horizon or direction indicator. The radio telephone set is a high-frequency unit working on one channel, frequently giving trouble.



The armament is light for current fighter design, consisting of one 20-mm Hispano motor-cannon firing through the propeller hub and mounted between the cylinder banks of the motor, and two 0.303-inch machine guns mounted in the nose and synchronized to fire through the propeller arc.

The motor is a 12-cylinder upright V-type Hispano-Suiza unit of French design and built in Russia under license. It has a maximum of 1,310 brake horsepower.

The main task of the YAK-3s was army cooperation. They supported troops in offensives of the Red Army by attacking enemy aircraft, or bombing and machine gunning the troops on the front. They also acted as bomber escort to P-2 bombers or Stormovik attack planes. Also, ten minutes before P-2s or Stormoviks attacked enemy airfields, YAK-3s would fly over the area and destroy enemy aircraft on the ground, fight them in the air, or prevent them from taking off. When the bombers arrived, they would cover them against attack by enemy fighters from other airfields.

Another duty was intercepting. The pilots would sit in their aircraft on the alert, and take off whenever they saw an enemy aircraft, or when told some were in sight.

Nearly all these missions called exactly for what the YAK-3 is—a fast-climbing, speedy, low-altitude interceptor. When fighting Fw 190s, it never climbed much over 5,000 meters (16,400 feet), at which altitude it had its best qualities; near the ground the YAK-3 out-turned the Jerry, and many a German pilot stalled and crashed when trying to follow one in a tight turn.

It may be interesting to note that one aircraft factory alone, No. 153, produced 15,000 YAK-3s during the war, whereas the total amount of aircraft received by the U. S. S. R. through lend-lease was 13,300.

(The Aeroplane, Great Britain)

CHINA

Chinese Armed Forces:

The Chinese Army was reduced to a quarter of its war strength (half of its pre-war strength) before June 1946.

In 1937, Nationalist China possessed 182 divisions. This number was gradually increased and reached the figure of 354 di-

visions at the end of the year 1944. At the present time it has been reduced to 253 divisions and shortly is to be further reduced to ninety divisions. Preparations are under way for the demobilization this year of 400,000 officers and 1,400,000 men. In a year's time, out of a total of 37,000 discharged officers, 27,000 have been placed in police units.

As regards the reorganization of guerrilla units, of independent defense groups and of advanced units in recovered regions, out of a total of 720,000 men, only 101,000 have been incorporated into regular units, and the others have been disbanded (obviously, this refers only to guerrilla units controlled by Chungking).

The armed forces of the puppet government which the Japanese had established at Nanking, totaled some 600,000 men, and allegedly they are being disbanded at present.

(France d'Abord)

INDIA

Evolution of the Indian Army:

Before this war, India had a fine and efficient army, but this army was not in itself well-balanced, that is, it was not so composed as to be able to take the field as it was. The reason for this was, that while the Indian Army had a large number of cavalry and infantry regiments, it had very little artillery, and, of the few artillery units then in existence, the great majority were mountain artillery batteries, very efficient, but of necessity equipped only with small guns of short range.

The great bulk of the field artillery, and all the medium artillery of the Indian divisions which fought in the early stages of the war, was composed of British artillery units.

During the war this situation had been rectified and the army now has about sixty regiments of Royal Indian Artillery, including medium artillery with guns approaching six-inch caliber, field artillery, antitank artillery, antiaircraft batteries, heavy and light, in great number, and of course, our famous mountain batteries carried on mules.

The men of this new artillery are drawn from all parts of India, and notably from Madras.

In the future, the Indian Army must contain a proper proportion of all the various arms—armored corps, infantry, artillery, engineers, signals, transport, and so on, so that it shall be a self-contained army able to take the field without seeking aid from elsewhere.

(Indian Information)

India's Amphibious Army:

Between January 1943 and the end of the war, nine whole divisions, enough to make an entire army, were trained in Combined Operations in India.

India's first Combined Training Center, at Madh Island near Bombay, was founded in 1943, and became one of the three biggest Combined Operation Training bases in the world. The other main base was at Cocanada, 300 miles north of Madras.

At Madh Island, not only were the proper drills taught for using landing craft but staff officers were instructed in the complicated problems of planning and organization of a combined operation.

The course there was carefully graded, and culminated in full-scale operations, north and south of Bombay, giving the troops the chance of living at sea in a landing ship for periods of seven days.

Also trained to play their part in a combined operation were five Beach Groups. A Beach Group, equivalent in strength to a brigade, is the unit which organizes the beach after the assault wave has secured the beachhead.

Until early 1945, the European Theater of war had priority of craft and equipment, and the Combined Operations organization in India had to work with what could be spared from there. Teams from the CTC assisted in the planning of no fewer than ten operations which had to be canceled

because the craft were needed in Italy or elsewhere.

When at last there was an abundance of amphibious equipment, the Japanese war was over. The achievement remains. Had the war not ended, tens of thousands of trained troops were ready to assault the beaches of Southeast Asia.

(Indian Army Review)

Indian Army Casualties:

Indian Army battle casualties from the outbreak of the war on 3 September 1939 to 28 February 1945, totaled 149,225. This figure does not include 5,835 other ranks of the Hongkong and Singapore Royal Artillery.

The total of 149,225 is made up as follows: killed, 15,291; wounded, 50,705; missing, 10,371; prisoners of war, 51,802; believed prisoners of war, 21,056.

The greatest number of casualties (62,175) occurred in Malaya shortly after Japan's entry into the war. Next to Malaya is Burma with 40,458. Third in the list comes Italy, with 22,497.

In North Africa, casualties numbered 15,248.

The severity of the fighting in Sudan and Eritrea is indicated by the number of wounded (4,017) and killed (731).

Paiforce (Iraq and Iran), through which ran a vital lifeline to Russia, cost seventy-two killed, ninety-six wounded, and one missing; in Palestine and Syria, eighty-six were killed and 287 wounded. Total casualties in Greece were 314.

(Indian Information)

AUSTRALIA

Hypnosis Aid to Surgery:

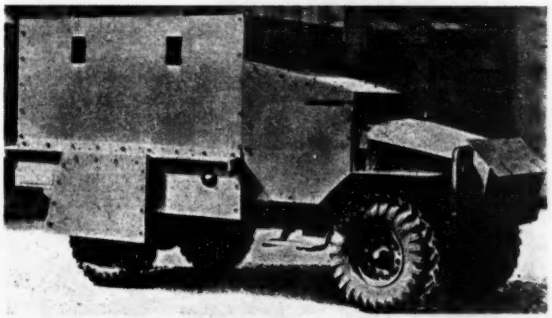
Operations on hypnotized war prisoners in Malaya may lead to greater use of this form of anesthetic in surgical practice. Two doctors, an Australian captain and a Netherlands lieutenant, have kept an account of twenty-nine cases in which they substituted hypnosis for anesthetic at a prisoner of war hospital in Singapore. A recent article in the Australian Medical Journal says: "Results obtained at least indicate some possible surgical application of hypnosis, and suggests that more work might lead to results of considerable value." Operations include surgery on hands, toes, and legs. The doctors said the patients were hypnotized lying supine on a table by "convergence fatigue"—gazing at the point of a pencil.

(Australian Weekly Review)

GREAT BRITAIN

The "Armadillo":

The armored vehicle pictured below, known as the "Armadillo," was produced in 1940 as a defense against German paratroops.



Designed to protect airfields of the RAF fighter planes, over a thousand of these vehicles were rushed through after Dunkirk.

(The Illustrated London News)

New Bomber-Transport:

A new aircraft that can be used either as a bomber or a transport has been produced to meet the requirements of the Royal Air Force and the airborne forces. Known

as the AIX, it is a revised version of the Handley Page Halifax.

When being used for the airborne forces the AIX can carry crews of sixteen fully equipped parachute troops and two men to control the dropping of the parachutists.

Powered by four Bristol radial motors of 1,675 horsepower, the aircraft has a maximum speed with a full load, of 320 miles per hour. Its maximum range is 2,080 miles and its maximum load is 8,695 pounds.

(From a news report)

The "Giraffe":

An unusual machine designed by the British Ministry of Supply for the wading of supplies from ship to shore during invasion operations was the "Giraffe," which is pictured above.

This strange-looking device never did go into action, however, as it was eventually scrapped and replaced by waterproofed vehicles for beach landings.

(The Illustrated London News)

One-ton Depth-Charge:

At the height of the U-boat campaign against Britain, it became apparent that the Germans were replying to our tactics of depth-charging large areas by instructing their commanders to take station at depth and thus "lie doggo" during an attack, afterwards surfacing to continue the work of destroying merchant shipping. The Royal Navy replied to this in no uncertain fashion, bringing out the one-ton depth-charge as compared with the 300-pound depth-charge then in normal use. The one-ton depth-charge was too big to be fired by ordinary means. It was therefore designed to be fired from the torpedo tubes of a destroyer and accordingly had to be twenty-one inches in diameter. It was fitted with a buoyancy chamber at either end to reduce its rate of sinking to the depth at which it was set to explode. This gave the firing ship time to get away from the heavy underwater explosion, which embraced a very wide area.

(*The Sphere*, Great Britain)

Drinking Water from the Sea:

The lives of many naval and RAF pilots rescued after crashing in the sea were saved during the war by the latest and most successful method of producing drinking water from sea water.

The standard apparatus consists of a flexible rubberized purifier, combining waterproofed chemical charges and a Perspex drinking box. Each charge when shaken up after a few minutes with sea water in the purifier and then squeezed through the filter cloth produces half a pint of water. The complete pack thus provides four and a half pints of pure water in all, which is several times its own volume in size.

(*The Fighting Forces*, Great Britain)

UNITED STATES

U-boats' Nemesis:

Details of a new secret weapon, the Mark 10 and 11 Antisubmarine Projector, nicknamed the "hedgehog," which replaced the depth-charge and is credited with being one of the most effective surface weapons directed against German submarines during the war, have been revealed.

Operating on the rocket principle, the device mounts twenty-four projectiles, arranged in a bank. The hedgehog, designed to keep level despite the yaw and the roll of the sea, hurls twenty-four charges from the bow of the attacking ship in an elliptical pattern above the calculated position of the submarine. The charges are hurled within two-and-a-half seconds by the Mark 10 and in 1.8 seconds by the improved Mark 11, which also covers a large area.

The projectiles explode on contact only, instead of the principle that detonates the depth-charge. Thus when the attacker hears an underwater explosion, he knows that a hit has been scored. This procedure also eliminates the involved and, at times, dangerous procedure of running the ship past the underwater target and dropping depth-charges from the stern.

The hedgehog was designed originally in Great Britain. In mid-June 1942, the English drawings of the device were received by the United States. The design was adapted to American standards of production and in less than four months the first completed projector unit was delivered to the Navy. Thereafter the Mark 10 was installed secretly on subchasers at the production rate of eighty a month.

(From a news report)

New Mobile Artillery:

In the photograph (Figure 1) are three ultra-new self-propelled artillery weapons, hitherto secret, to increase the mobility and striking power of our ground forces. Left to right are the 155-mm howitzer motor carriage

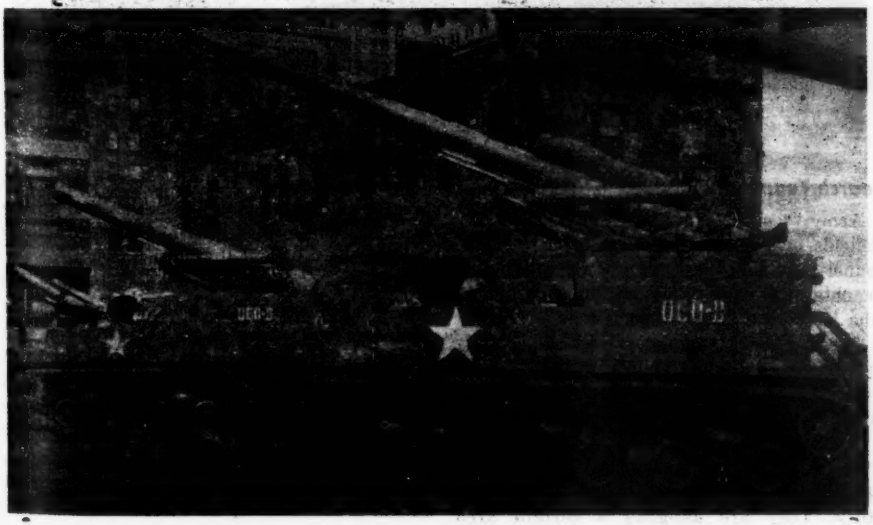


Figure 1.

M41, the 8-inch howitzer motor carriage T89, and the 155-mm gun motor carriage. The M41, in Figure 2 is fast traveling, has a low silhouette, and employs the torsion-bar suspension.

(Army Ordnance)

Figure 2.

Search Teams:

Army "search teams" are combing the battlefields of Europe and the Pacific for personnel now listed as missing in action and to obtain further information on soldiers who have been killed in combat.

These special teams attempt to clarify the status of approximately 20,000 Ground Force and Air Force men, listed as missing in all theaters.

A "search team" consists of five soldiers, either officers or enlisted men, one of whom speaks the language of that specific locality. They are assigned a certain area of approximately one and one-half square miles. Information on missing-in-action personnel is consolidated and the team blankets the area interviewing village officials and natives for leading information.

When an unmarked grave is discovered the body is checked for identification and is shipped to an American cemetery in that district. This work is done in coordination with Graves Registration, which supervises and operates all overseas cemeteries.

Almost daily, these teams turn up new information on missing-in-action personnel, and through the War Department the next of kin is immediately notified.

(Army Times)

FOREIGN MILITARY DIGESTS

CONTENTS

The Rocket and the Future of Warfare

Digested at the Command and Staff College from an article by Flight Lieutenant A. C. Clarke, RAF in "The Royal Air Force Quarterly" (Great Britain) March 1946.

THE rocket is now making its third and probably final appearance on the field of warfare. After its original employment by the Chinese in the thirteenth century it was used sporadically by various Western countries for over five hundred years without attaining any great importance.

For a while every army in Europe had a corps of rocket artillery, but with the development of rifled artillery, the rocket was soon completely eclipsed, and for nearly a hundred years it was used only for signaling, life-saving, and a few other specialized applications. It played very little part in the 1914 war and its spectacular return in the early 1940's has been due to the mastery of new engineering techniques and a greater appreciation of its potentialities. Even ten years ago few believed that the rocket would ever again play any major part in warfare, yet today it is challenging both artillery and aircraft and promises to be a decisive weapon in any future war.

The two dominant characteristics of the rocket are its enormous rate of power generation (a thousand or more times as great as that of a conventional engine of similar size) and its independence of any external medium for fuel, support, or thrust. The first property enables it to achieve very high speeds and accelerations, the second permits it to travel in the rarefied air of the upper atmosphere, or in no air at all. Also as a result of the second property the rocket has no recoil and this gives it an important, and in some cases, overwhelming advantage over ordinary artillery.

Short-Range Rockets

Rockets of this class have played a considerable part in the late war, particularly when used by aircraft for ship or ground attack. They have the great advantage of producing no recoil and so requiring only very light launching equipment. It is thus possible to concentrate very large numbers of projectors in a single place and so lay down short-range barrages of an intensity impossible by other means. Batteries of this type ("Katushka") were used by the Russians at Stalingrad and mobile installations were employed later in the war for saturation bombardment preceding attacks or landings. For this application the short range and inaccuracy of the weapon do not matter, and if barrages are ever again used in warfare they are more likely to be provided by rockets than by other forms of artillery.

The rocket's absence of recoil has made it possible to design weapons of great fire power which can be operated by a very small crew or even by a single man. The "bazooka" antitank gun is the best example of this and may well mark the beginning of the end of tank warfare. A few infantrymen can now destroy the largest tank and it must be remembered that whereas the bazooka is only at the beginning of its development the amount of armor a tank can carry appears to be nearing its limit.

The rocket mine would seem to be a particularly effective antitank weapon, now made possible by the invention of "zero length" launchers. It would consist of a short launching rack buried vertically in the ground and, although it would not be as easy to install as a normal mine, it would be a great deal more effective against armored vehicles.

The airborne rocket has already had a revolutionary effect on aircraft fire power and the process will continue. The largest gun (75-mm), so far installed in an aircraft, weighed 760 pounds and fired a fifteen pound shell containing only 1.5 pounds of explosive. These 760 pounds could have been replaced by twelve 60-pound rockets of far greater destructive power, and when they had been discharged the aircraft's performance would not have been reduced by the dead weight of the gun. There is no limit to the size of

projectile that can be launched from an aircraft, so long as it can be lifted off the ground. Aircraft fitted with such weapons could prevent all movement of armored vehicles except those supported by air cover.

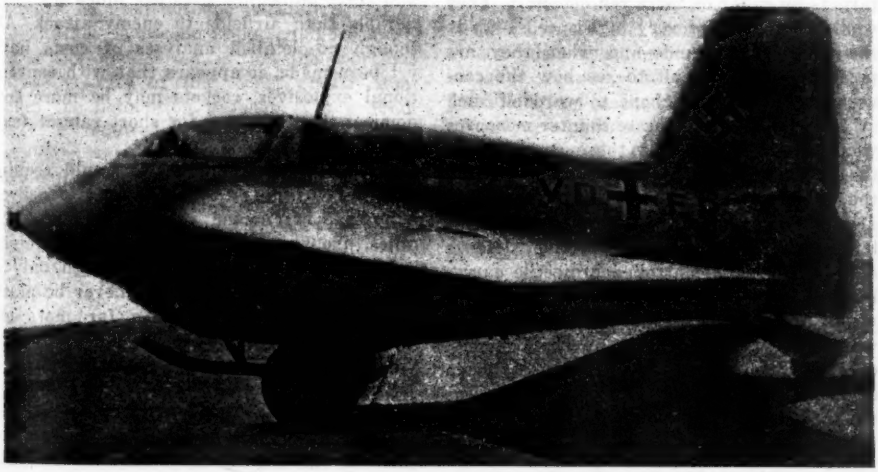
Before leaving the subject of short-range rockets, mention should also be made of assisted take-off units ("Jatos"), which have been extensively used during the war. These units permit a considerable increase in take-off weight and hence performance, and they can also be used to reduce the length of runway an aircraft needs to become airborne. Both these applications are of great practical importance and rocket-assisted take-off may become standard practice for large aircraft.

Medium-Range Rockets

A class of machine which was beginning to appear at the end of the war and promises to revolutionize air fighting as we know it today, is the medium-range rocket interceptor, of which both piloted and guided versions were under intensive development by the Germans at the end of hostilities in Europe.

One, the Me 163, actually became operational, and a second, the "Natter," was undergoing flight tests when the war ended. Both were manned rockets of very short endurance (about five minutes under full power), but with phenomenal rates of climb. The Me 163 could reach 40,000 feet in three minutes, while the Natter could do so in little over a minute.

There is no doubt that such machines will be developed extensively in the future and they may be expected completely to supersede the conventional interceptor fighter. Their high rate of climb would enable them to remain on the ground until the attacking bombers were only a few miles away. They would then go almost vertically into action, break off the engagement and return to earth.



The Me 163.

Such machines, themselves launching rocket projectiles into the bomber streams, present a very considerable problem to the attacker. They could be countered only by heavy barrages, or by the use of such enormous speeds that interception was impossible. This in turn means the superseding of the bomber by the long-range rocket, and at this stage the human pilot begins to disappear from the picture.

The human body can withstand only lim-

ited accelerations, can respond to only a few stimuli at a time, and has comparatively slow reactions. The speed of attack is steadily increasing and the 3,400 miles an hour of V-2 is merely the beginning. Against such speeds men can never hope to fight. Skill and courage and resolution—in the end all are of no avail, for there comes at last a time when only machines can fight machines.

At the close of the war the Germans were working desperately on a large number of guided rockets controlled from the ground by radio and directed into the bomber streams, where they would home on their targets by radar or infra-red detectors. They would be capable of very high speeds—up to the velocity of sound—and when they are perfected it is difficult to see how the conventional bomber can hope to ward off such attacks. No doubt elaborate counter-measures would be tried, such as those employed in the radar war, but it is impossible to jam the whole radio spectrum. Automatically homing rockets might be deceived for a while, but there would be no effective defense against a ground-controlled projectile carrying AI (Aircraft Interception) and television and homing on the hundreds of kilowatts of heat thrown out by the bombers' engines. Such machines have already been developed and do not represent any great advance on existing technique.

Guided missiles are peculiarly adapted to naval operations, and for defensive purposes may well replace fighter aircraft at an early date. Large and vulnerable carriers will no longer be required purely to provide fighter cover, and the necessity of getting all aircraft safely down after an action will disappear, thus giving the fleet much greater freedom of action. Guided rockets could also, to a large extent, replace heavy guns for long-range engagements, with a consequent saving of weight of many thousands of tons in the case of a capital ship.

The guided rocket appears to be the only conceivable defense against the long-range rocket bomb, and this possibility will now be discussed.

Long-Range Rockets

We have seen that by increasing its speed sufficiently a rocket can be given even antipodal ranges, although at the expense of very small payloads. So far, the only long-range rocket has been V-2, which had a maximum speed of 3,400 miles an hour and a range of 220 miles. The Germans had planned to increase that range to 3,000 miles by giving V-2 wings and launching it from a much larger "booster" rocket (A-10) which would have weighed about eighty-five tons.

There is at present no defense against such projectiles once they have been fired, and their launching sites are much less vulnerable than airfields to enemy attack. Although no detailed analyses of costs have yet been made, it appears that with conventional explosives, rockets may be more economical than bombers for short ranges (say up to 400 miles).

With present techniques it would require a rocket weighing about 100 tons to deliver a payload of one ton at a distance of 3,000 miles, about seventy per cent of this weight being fuel. As atomic bombs weigh only a few hundred pounds and can never be much larger—though they will be far more efficient—it seems impossible to make any convincing case for the very heavy bomber.

The main objection to the rocket as a long-range weapon is its inaccuracy, but that is a defect which will certainly be overcome in time by the use of target-locating devices, radio lattices or television. It would be virtually impossible to jam a rocket controlled by a locked microwave beam from a high-altitude relay aircraft several hundred miles away, particularly as the radio control might only be required for a very few seconds when the projectile was nearing its target. It will also be possible to develop entirely self-contained controls similar to those used in the later V-2's fired against London. They would comprise course integrators which could be set for any required destination and could not be affected by any external means. Once it had been launched only actual collision could deflect such a projectile from its target.

Against such weapons no complete defense would be possible. The only defense of any kind would be the guided rocket, and one can visualize the development of small machines capable of accelerations of 100g or more and homing on radiation, radar or even local gravity fields.

However, even these machines would have little chance of intercepting, in a matter of seconds, projectiles traveling at 3,000 or more miles an hour.

As many have pointed out, the rocket is the ideal means of delivering atomic explosives and may soon prove the only method that can be used without the destruction of the attacker. A second important advantage, not so far emphasized, is that the enormous impact velocity of the rocket greatly simplifies the detonation problem if a ground-burst is required. The sub-critical masses have only to be placed on the axial line and they will be united at a speed which will prevent premature detonation and make unnecessary the complicated "gun" arrangements in the present atomic bombs.

Should it become possible to build atomically *propelled* rockets with motors of no more than the efficiency of the Hiroshima bomb (about 0.1 per cent), the resulting jet velocities would be many millions of miles an hour, and the theoretical limit is the velocity of light itself. Although, of course, such speeds would be out of the question inside the atmosphere, it would be relatively easy to design rockets flying under continuous thrust at very high accelerations along constantly "randomed" paths. The interception of such machines by any material projectile would be virtually impossible, since even if they could be detected their destinations could not be foreseen until it was too late.

The Shape of Future Wars

One's first reaction to the new order of magnitude presented by the combination of the rocket and atomic power is one of incredulity, but the technological nightmare which any future war will inevitably bring cannot be dispelled by closing one's eyes. All the weapons we have described can be built and will be if they are required. Most, indeed, already exist at this moment in prototype form.

It has been said that no weapon is decisive and that to every form of attack there is some defense. Whatever truth these statements may once have had, they belong to an age which has passed. In the guided rocket the Germans may have had the answer to the heavy bomber, but it came too late to prevent the destruction of their cities. During the interval between the adoption of a new weapon and its countering, the damage done to the material structure of civilization grows steadily greater, and there must come a time at last when breakdown occurs. The present state of Germany shows how nearly that point had been reached even with the weapons of the pre-atomic age.

No instrument of war has ever been conceived that lends itself so perfectly as the rocket to treacherous, unheralded and possibly over-whelming attack. The combination of rocket and atomic explosive raises the possibility of an entirely new type of warfare. Total war is bounded only by the limits of man's material powers, and those limits are swiftly receding towards infinity.

What part armed forces, as we know them today, will play in any major war between great powers will depend on how far the technological revolution has advanced. The statement that armies and navies are obsolete is certainly not true at the present day nor is it likely to be for many years to come. Countries may be defeated by long-range weapons, but they must then be occupied even if there is no land fighting. The invasion of Japan by unsupported newspaper correspondents, to quote de Seversky, shows that this stage is perhaps already here.

An important naval development will probably be the mobile rocket launcher, almost certainly a submersible. Its purpose would be to approach an enemy country and fire long-range rockets at selected targets, perhaps along trajectories that would make the victim suspect some entirely innocent neigh-

bor. Such a scheme would have an irresistible attraction to certain types of mind: the treachery required involves no more than a straight-line extrapolation through Pearl Harbor.

The effect of the new weapons on field armies is difficult to analyze. Any nation fearing invasion would use its long-range weapons to the uttermost against approaching armies, knowing that the opportunity would pass when the battle had been joined. It is difficult to see how any assault could be launched in the face of weapons that have already destroyed a hundred thousand lives in an instant of time, and it seems more than likely that the armies would not, in fact, move forward until the issue had been decided.

Armies will, of course, still be required for many types of fighting. No one imagines that long-range rockets would have assisted greatly in the Burma campaign, but it must not be forgotten that the very existence of the new weapons makes improbable such campaigns as the long struggle for air bases witnessed in the Pacific. Much of the bloody "island-hopping" of the Eastern War would have been unnecessary had the Allies possessed the means of delivering bomb loads accurately at ranges of three thousand miles.

The status of air forces has already been touched upon. For the near future we can visualize the development of small, high-speed forces for specialized precision bombing, but for the heavy bomber there seems no future at all. Not only will it be superseded by more effective methods of attack, but the defense against it appears to be in sight.

Troop and equipment carriers will certainly be needed, perhaps on the largest scale, but they could only be used in areas where the danger from guided missiles was small, since they would be even more vulnerable than bombers. Once they had landed their material it would at once come under bombardment: probably these forces would be used to move armies forward when it was clear that the initial long-range attack had been successful.

The fighter, as a defensive weapon, will give way to the guided rocket in the relatively near future. For long-range offense it may play a considerable part for many years, until automatic and remote controls have reached a very high degree of perfection. But ultimately even here it will be superseded, for there are no limits to what may be done by machines, whereas there are very definite limits to men's physical powers—in particular their ability to withstand high accelerations. There is also a psychological factor of some importance to be considered in this case. Men—at least normal men—will not risk their lives on dangerous missions when they know that the same operation can be carried out by controllers sitting in safety before television screens.

Combat between remotely controlled machines is a possibility, but not a very likely one, for such aircraft would rely on their speed to avoid situations where they had to fight. The problem of designing purely automatic—as opposed to remotely controlled—fighters capable of more than holding their own against piloted machines is one of extreme difficulty, but great technical interest. With any automatic equipment there comes a stage when further complexity defeats its own end, but often by the time this point is reached the designer is unable or unwilling to stop. This tendency was noticeable in certain aspects of Allied radar, and was still more prominent in German V-weapon research. Therefore, it should not be assumed that a device will never be developed simply because it is excessively complex or of little military value.

Brazilian-American Military Collaboration

Translated and Digested at the Command and Staff College from an article in Portuguese by Major General E. Leitão de Carvalho in "A Defesa Nacional" (Brazil) February 1946.

Introduction

IN the past the geographical position of the United States gave it considerable advantages in defending itself from an attack anywhere within the continent. But England, that had extensive interests in America, did not possess the same advantages, since the centers of supply were outside its territorial boundaries. With its powerful navy, however, it could compensate for this, for it could not only maintain the sea lanes of the Atlantic, but even forestall any attempt of European imperialists to establish themselves in the New World.

World War I

The great crisis of 1914-1918 did away with that illusion and demonstrated with full force the terrible reality. World War I tested the politico-military system on which the security of the United States rested on the Atlantic side. The resistance to participate in the war was profoundly imbeded in public opinion, which had been accustomed for so long to consider itself unaffected by the struggles of other continents, especially Europe. Some American statesmen, however, understood the trend of world affairs and realized the necessity of providing an adequate military defense for the nation in order to safeguard its national and international interests.

The ostensible reasons why Brazil entered World War I were the attacks on our merchant vessels by German submarines; attacks that first brought about the rupture of diplomatic relations and later open belligerency when, in spite of the protests of the Brazilian Foreign Office, the Germans continued their open submarine warfare. Later, when the United States declared war on Germany, Brazil in no uncertain terms did the same.

World War II

After the defeat of the Central Powers had achieved the objective which forced the United States to declare war, a spirit of isolationism once again swept the country. The result of that grave mistake was World War II, with its consequent unprecedented sufferings and terrible expenses.

The occupation of the Rhineland by the Nazis in 1936 warned the statesmen of the United States. The attitude assumed by the Great European Powers responsible for the execution of the Treaty of Versailles and other instruments negotiated later for the maintenance of peace, characterized itself in the League of Nations, as well as outside of it, by such a marked vacillation that it could only stimulate the lawlessness of the German government. It was obvious that the world was headed for another great war, if German aggression was not checked in time.

In the Western Hemisphere the aim of the United States was to create a feeling of comprehension among the American Republics, which would favor the acceptance of the principle that the security of the continent was of interest to all. This farsighted policy of American cooperation, although it satisfied the interests of all the nations of the hemisphere, was above all a direct concern of the United States, because it eliminated the possibility that a European enemy might acquire bases on the continent from which to attack strategic points of the nation. Once the solidarity of America had been achieved, the United States could await the European crisis with less anxiety for the continent would be in a better position to defend itself.

If we were to study the real motives which forced the United States to enter World War I, we would have to admit that they arose when British seapower ran the risk of being supplanted in the Atlantic, thereby menacing the sea lanes which are so closely linked to the military and economic interests of the American people.

The time for the intervention of the United

States in World War II appeared, therefore, to have passed, once the security of the Atlantic Ocean was guaranteed and any possibility of attack in the Western Hemisphere eliminated. But the treacherous attack on Pearl Harbor forced the United States to fight a tremendous war on two fronts separated by two oceans.

In calculating the necessary means to safeguard the United States from an attack by land or sea by the Axis powers, a new factor, which had proved very effective in previous wars, had a decisive influence. While the war was fought against land and sea forces, the defense of the continent merely required an advance party made up of Anglo-American naval forces and bases in the regions of the north and south which would forestall any enemy land attack. The employment, however, of long-range aviation with great carrying capacity transformed installations, once considered protected from the enemy, into vulnerable defensive field works.

The security of the United States against enemy air attack in the Atlantic was assured by a chain of bases from Iceland to Africa, passing through Greenland, Newfoundland, the Antilles, the Guianas, Brazil, and Ascension Islands. The southern flank of this chain, the northwest of Brazil, was of vital importance for the security of the United States and the Panama Canal. This justifies the insistence of the United States to obtain from Brazil, even while it was neutral, permission to use the most advantageous points in our territory for naval and air operations, in case the United States entered the war against the Axis. Our consent to the execution of these preparatory measures required for the utilization of our territory, would merely anticipate the collaboration which our country would have to lend to the rest of the American republics in case of an attack.

Once the war had started in the Old World, with the Germans as victorious aggressors over the peoples of Europe, France overrun, and the British Expeditionary Force defeated on the continent, the critical moment for the security of America, when the existence of British sea power and the free sea lanes of the Atlantic would be tested, was near at hand. The Germans had lost the Battle of Britain, but the British Navy was in danger. Under these conditions, it was urgent that measures for the collaboration of the United States and Brazil be put into effect.

After the treacherous Pearl Harbor attack, the President of Brazil sent a message to the American government declaring that "Brazil joins solidly with the United States, in accordance with its traditions and international obligations." This accentuated the necessity of putting into execution the military and diplomatic measures required by our pre-war situation.

The Inspector of the 1st Group of Military Regions, who eventually might become the commander of the theater of operations if Northeastern Brazil were involved, formulated, on orders from the government, the plan for the defense of Northeastern Brazil. After a study of the terrain and inspections of the personnel and matériel he presented his plan.

Meanwhile, by verbal permission, in March 1942 the United States was authorized to construct the bases of Belém, Natal, and Recife. On 23 May 1942 the two governments finally signed an accord which established the conditions that would govern the military and economic collaboration of the two countries in defending the Western Hemisphere.

This accord provided for the establishment of two mixed commissions made up of army, naval, and air officers of both countries, which would formulate plans of mutual defense, and reach the necessary agreement between the two General Staffs. These were duties of a truly international general staff.

The great problem that the Joint Defense Commission in Washington would have to solve would be to organize the defense of Northeast Brazil, where the great air bases would be located. It was finally solved by adopting the defensive plan of the Brazilian delegation. It was also decided that the major units charged with this defense could also be employed outside the continent in collaboration with the American forces, if the Brazilian government so decided. This ex-

plains the proposal of the Joint Defense Commission which provided for an Expeditionary Force of three divisions.

The Commission finally approved the plan for the collaboration of our armed forces outside the continent on 21 August 1943—the day before our first anniversary of the declaration of war. Once the plans had been approved the practical measures for the organization of the Expeditionary Force was left up to the Brazilians. The complete success was due to the efficiency and the collaboration constantly displayed by the Brazilian and American Army, Naval, and Air officers.

Some Military Aspects of Geography

Translated and digested at the Command and Staff College from an article in French by Admiral Castex in "Revue de Défense Nationale" (France) February 1946.

THE influence of geography on military operations has often been exaggerated. Today, as at other times when this factor has been emphasized, there is a tendency to credit geography with undue importance, even to the point of conceding victory in advance to the side enjoying the more favorable geographic situation, without regard for any other factor. That this method of reasoning is faulty, can be seen in the case of the Anglo-German conflict in the North Sea during World War I. In spite of the unusually advantageous situation enjoyed by the English from the standpoint of geography, matters would unfortunately have been very different if the Germans had possessed naval superiority.

Many other cases of this sort, both hypothetical and real, can be cited. It was often said, during the years following 1918, that geography had conferred complete mastery of the Central Mediterranean on the Italians, as opposed to an Anglo-French coalition. With Spezzia, Cagliari, Trapani, Augusta, Tripoli, Tobruk, etc., as centers, and using a radius equal to the practical range of the bombing aviation of the period, impressive circles were drawn, within which Italian naval aviation would be in complete control.

If, however without changing anything in the disposition of the land and sea areas, we reverse the above hypothesis by supposing air superiority to be in the hands of the Anglo-French, we arrive at entirely different results. We can trace other circles using Toulon, Ajaccio, Bizerte, Malta, the Egyptian frontier, etc., as centers. Anglo-French aviation controlling the new circumscribed areas, would dominate those shown in the Italian circles. Naval superiority will then change sides. It will now be on the side of the Anglo-French. It will be even more marked than in the preceding case, for in this instance the Anglo-French will have possibilities of withdrawal to the two ends of the Mediterranean. Thus we see that the situation has changed entirely, in spite of the immutability of the geographic aspect.

Similar observations can be made regarding the relative position of Germany and England about July 1940. Since the beginning of the war the geographic situation had been considerably modified to the advantage of Germany, which at first possessed only a small bit of coast on the North Sea between Denmark and Holland, but later succeeded in getting into her hands an enormous stretch of coast extending from the extreme northern portion of Norway to the Pyrenees, which could have constituted a magnificent spring-board for an assault on the United Kingdom. It was still necessary, however, to get her army across the sea.

The attack on British communications had become easier and German surface vessels could now make use of more advantageously located bases. The Atlantic ports offered the ships charged with pursuit operations on the high seas, advantages greatly superior to those offered by the ports of Norway. In spite

of this, they were still faced with the great superiority of the enemy fleet. In addition to this, England still had at her disposal in the northern and western portion of her islands, considerable opportunities for evading the enemy. The German submarine found like advantages in the way of bases in this new situation. German communications were at last enjoying the advantages of a wide open gateway to the ocean, which had long been the dream of the submarines from beyond the Rhine. This gateway to the open sea continued to be precarious, however, exposed as it was to British attacks which always threatened the flanks of the new routes, which were little less vulnerable than the old ones.

The attack of British territory was obviously simplified. The principal assembly positions, constituted by the Channel and Belgian coasts, had been brought closer to the objective. Even the other parts of the enormous sea front held by the Germans could be used for the same purpose. The distance that had to be covered was greater, but the assembly areas would certainly not be so well watched for the very reason that they were farther away. Nevertheless intervention of the enemy fleet was to be feared. This fleet, assuming it were absent at the moment of the first alerts, could still prevent the subsequent transportation of reinforcements, equipment and food.

Aerial warfare, directed both at British territory and sea communications, could be waged much more vigorously by the Germans with all their aircraft, under this situation. Fighter aircraft could take a hand and constitute an effective escort for the bombers. The use of airborne and parachute forces, as well as that of certain special equipment such as flying bombs, was especially easy over such short distances.

Nevertheless, the defense was likewise much better situated for retaliation if not against Germany itself, at least against its naval and air bases located on French soil or soil adjoining France, and nothing stood in the way of England's attaining air supremacy. Everything was to depend on the ratio between the respective air forces. Thus, even though the geographic situation had changed in Germany's favor the true situation had not improved to an equal extent—very far from it. In the end it was not the Germans, in spite of their advantageous geographic position, who invaded the British Isles, but it was the Anglo-Saxons of the Isles who invaded the continent where the Germans were in control.

These few typical examples show how easy it is to exaggerate the importance of geography. Having demonstrated this let us recognize, on the other hand, that although it is true that the ratio of ground, naval, or air forces can alter a situation, it cannot, however, succeed in overcoming a handicap due to a geography that is too unfavorable. During the years following 1918 the French Navy had at times been asked to carry provisions by sea to Poland and the "Petite Entente." The combination, France—"Petite Entente," whether political or military, possessed a hereditary defect of a geographic nature. Russia in 1936-38 met with similar difficulties in making her influence felt in Spain. In this case, geography was so extremely unfavorable to the Russians that it settled the questions almost alone.

Area

Area is a special element of the geography of war of which usually little or nothing is said. It does not play an obvious or striking part in the conduct of operations as do the various forces, fronts, distances, supplies, etc., but it frequently makes itself felt. Its effect is seen most clearly in ground warfare, and numerous examples of this could be cited.

It is difficult to estimate the forces needed for covering and maintaining control of an area, even when we are concerned only with a simple "occupation" requiring only unimportant operations. When, toward the close of World War I, the Central Powers found themselves obliged to occupy part of Russia in addition to Rumania, it caused them to assign to this area a great quantity of forces, which in March 1918 reached a total of eighty-six divisions. Even though these were

probably second rate units, and their strength dropped in May to fifty-eight divisions and in July to fifty-three owing to the demands of the Western Front, this was nevertheless a very great immobilization of forces. This was done merely in an attempt to cover the area, for the Eastern Front was in process of complete disintegration and was not able to offer any serious resistance.

The Chinese war of 1937 to 1944 brought this same concept to the attention of the Japanese. Independently of the troops they supplied to the various fronts, they were forced to immobilize considerable forces for guarding their rear areas, which were menaced by the guerrilla activities of the Chinese Partisans. Moreover, under these conditions, they were able to hold only the larger centers and the main lines of communication. The Germans, in 1944 and 1945, were defeated because of the occupation of vast expanses of territory which they had unwisely conquered in Russia, France, the Netherlands, Scandinavia, and the Balkans. This occupation resulted in a considerable tying up of forces. In addition to this, great amounts of supplies and material had to be maintained far from the theaters of operations where their presence might have changed the situation.

The Allies will certainly have the same experience in their occupation of Germany, as well as of Japan and its dependencies. They will find, to their great surprise, that the occupation which they considered possible at little cost, will swallow up, in reality, enormous quantities of personnel even though no actual military operations are conducted.

On the seas we are faced with the same problem in connection with the maintenance of patrols. The nature of this action is well known. One establishes himself in a certain ocean area, which is criss-crossed in every direction by means of patrols to guard it against possible incursion on the part of the enemy. Naturally, in doing this, one is tied down, immobilized, and worse still, one wastes a quantity of forces which could be better employed elsewhere. The result is the same if an effort is made to maintain a watch at the various geographic accidents existing in the theater of operations (capes, straits, various oceanic narrows, etc.), which has been done frequently by means of submarines.

In aerial warfare, area has to be taken into account in relation to the effectiveness of air bombardments. In 1940-41 London was attacked by German aviation which unloaded enormous quantities of explosives, at times as much as one or two thousand tons in a single attack, to say nothing of incendiary bombs. In a short time there should have been nothing left of the city, but though it was sorely tried it still stands. This will be better understood if one will but stop to consider that the city of London covered a rectangle of some 500 square kilometers. If we consider that many of the hits occurred in the same place and also take account of open spaces, we shall have an idea of the capacity of this area for absorbing explosions. It was the same thing in the case of Berlin. If we include the suburban towns in this geographical term, we find that even though its center was pulverized, the great mass of Berlin was far from being destroyed because of its great area. This has been the case with all very large cities.

If we consider now, not a single city but the entire expanse of territory of a country, we arrive at the same results. There is a natural tendency to give the greatest possible range to aircraft so that not even the most distant points may be able to escape its attacks, but since it would be paradoxical for the nearest points to be spared, aviation must attempt to cover the entire expanse of territory corresponding to its maximum radius of activity. This is necessary, for the defender will attempt to employ dispersion, which in the final analysis is nothing more than exploitation of the area for defense purposes.

Insularity

Another geographic factor which we should consider is *insularity*. Formerly this was a matter of great strategic consequence, but this can no longer be said of it except when new concepts of space are considered. At

one time, England enjoyed this advantage of insularity. It conferred upon her, so long as she retained her mastery of the seas, an immunity from attacks on her soil. This situation was enormously modified in the face of an enemy situated on the coasts of the continent facing the island. Continental aviation, taking off from bases sufficiently near was not only able to execute attacks against English territory, but was also able to harass British sea communications, threatening them seriously. Enemy submarines enjoyed similar opportunities and certain surface craft such as small torpedo boats or launches, could be used advantageously at these short distances, and were a dangerous menace to traffic making use of the southern waters of the British Isles. In short, reaction from the continent had increased, especially by way of the air, and in such a manner that England no longer enjoyed the security of her insularity of days gone by. The distance that separated her from the continent had become too small, in view of the enemy's possibilities. The weak point in insular dispositions, even in the case of a power that is mistress of the seas, is and always has been, too close proximity of a continental area dominated by an adversary who was superior on the land.

Under such conditions the only remedy that can be employed for recovering the former insularity, is to increase the distances. It is necessary to place something like the ocean between the continental threat and one's self in order to restore the former protection and security. It was thus that the British Empire, regarded as a whole, was able to enjoy the same insularity that the original home area enjoyed in times past. If this term is understood in its broad military sense, and if one considers that a country is insular when it is very difficult or impossible to attack it by land, and when the enemy is able to attack it only at the cost of an operation of great scope requiring complete and prolonged mastery of the seas, then, Canada, India, South Africa, Australia, and the majority of the English colonies are, in truth, insular. England made use of this semi-insular system against her continental enemy by extending her rear areas to the very limits of the globe. Thus, the British Empire took the place formerly occupied by the British Isles. The latter were no longer anything but an advanced position of the system, a portion of the front. The fall of this position would not have constituted a mortal peril for the rest, the latter being capable of holding out indefinitely. It was not enough to conquer London. There still remained the necessity of seizing possession in Ottawa, the Cape, Calcutta, Melbourne, and a number of other places.

Finally, the incorporation of the United States into this disposition completed it and increased its extent. In fact only countries such as the United States are heirs and custodians of true insularity in the face of European enemies. When it was said, during the course of this war, that the pole of the Anglo-Saxon world had moved from London to Washington this expressed not only political factors, but also the new situations as regarded insularity, one of the geographical elements of war.

Late in 1941, Germany succeeded in mobilizing Japan against Great Britain for the purpose of ruining the recovered insularity, by the entrance on the scene of a fresh naval surface force which was already at the scene of the contemplated action. A race was begun between the two sides, the one aiming at the recovery of insularity, the other bent on its second suppression, each viewing geography from the point of view of the technical innovations that had shortened distances. This insularity, as a general geographic factor, is something relative, momentary, and variable, which fluctuates with armament and depends on it. It is possible that the insularity of the moon will one day be in question as a result of some sensational discovery.

Air Support in Breakthrough Operations

Translated and digested at the Command and Staff College from a Russian article by Colonel N. Denisov in "Krasnaia Zvezda" (Red Star) 13 January 1945.

DURING World War II, the Red Army has developed several methods of cooperation between air and ground forces in breaking through enemy defenses. In breakthrough operations, the air forces strive to secure air superiority and render uninterrupted support to the attacking troops. This usually assumes the form of an aerial offensive by large air forces concentrated in a definite sector of the front.

Basically, the aerial offensive is divided into two periods: the preparation and support of the attack, and support of the operations of infantry and tanks in hostile rear areas. The success of the aerial offensive, especially in breaching permanent and deeply echeloned defenses is contingent upon the effective coordination of the efforts of air and ground forces.

To secure air superiority, air commanders should detail part of their forces to inflict concentrated blows on enemy airfields and this must be combined with an all-out effort to destroy the enemy air forces throughout the entire operation. The task of the fighters participating in the aerial offensive may be formulated as follows: Deny the air to the enemy and destroy as many of his planes as possible. It is not sufficient to clear the sky over the battlefield, they should be denied the possibility of approaching the battle zone and should be destroyed on their own territory.

This task can be successfully accomplished under present conditions. Our numerical superiority allows us to secure domination of the air by means of large-scale blockade of enemy airfields, and the shifting of aerial battles far into the depth of enemy-held territory. The air commander leaves part of his aerial patrols to protect the ground troops (these patrols are reinforced during infantry and tank attacks), and a reserve force in the airfields, while the bulk of the fighters is used to intercept and destroy enemy planes on their way from their bases to the battlefield.

Air supremacy solves one of the essential problems of cooperation between the air and ground forces in a breakthrough operation. Our bombers and Stormoviks are unhampered in the air and find themselves in an advantageous position. The effectiveness of their action against the enemy defenses depends only on how correctly their fire power is used during the operation. The system of planning an aerial offensive plays an important role in this respect. The air and ground commanders should determine in advance the way in which the fighters, bombers, and Stormoviks will meet the requests of various arms during the several stages of the battle.

It is well known that during a breakthrough the air force is called upon to support the attacking ground troops continuously. Three basic forms of cooperation may be used. Each of these determines the type of air activity and is closely connected with the needs of the artillery, infantry, or tanks. Let us examine briefly whose requests should be met first during the various stages of an aerial offensive.

One of the main tasks of an aerial offensive is the extending (mainly in depth) of the areas within the enemy's defenses which are brought under fire. This is particularly important in the breakthrough of fortified positions which are echeloned in depth. Most of the effort in support of the artillery is made during the aerial preparation of the attack. This does not mean that subsequent cooperation between aircraft and artillery will be unnecessary. On the contrary, when the artillery suddenly starts lagging behind the infantry or tanks, the role of the aircraft is most important. What we mean here is that during the aerial preparation the air force is transformed into an "aerial artillery" strengthening and supplementing the fire of hundreds of guns of various calibers.

The coordination of the combined action of aircraft and artillery during this period of

the operation is attained through a correct assignment of sectors of the enemy defenses to be attacked. A careful and repeated aerial photo reconnaissance of the entire fortified position can be of great aid in this respect. In assigning targets, the air forces should be given those objectives which are difficult to observe from the artillery observation posts.

During the preliminary stage of the aerial preparation, the bombers and Stormoviks operate more or less independently. Attacks carried out on a wide front attempt to destroy the enemy's manpower in the main line of resistance and harass his rear areas. Operations of the aircraft should be organized so as to conceal our general plan of attack, and especially the direction of the main effort. However, when the artillery preparation begins, all activities of the air forces are carried out in close cooperation with it. The blows from the air increase gradually and wind up in a short but powerful and concentrated attack on the enemy's main line of resistance just before the infantry and tanks launch their assault (this is tied in with the rolling barrage of the artillery).

While supporting the infantry and tank attack, the artillery has two missions to accomplish: the destruction of enemy fortifications, and the neutralization of his manpower and fire plan. The air commander should, therefore, organize the action of his bombers and Stormoviks in accordance with these basic artillery missions. The bombers (especially the dive bombers) should destroy those permanent fortifications which for one reason or another cannot be reached by artillery fire. The mission of the Stormoviks is to hit the enemy by striking at his second and third lines, artillery positions, communication centers, and reserves. This does not mean, however, that zones of action for artillery and aircraft should be sharply defined. The abundance and variety of targets require the closest cooperation of these two arms. Sometimes objectives which are visible from the ground and which can be reached by artillery fire may be bombed from the air. The bombers are able to increase the devastating effect of artillery shells by using their own heavy bombs. The significance of joint aerial and artillery preparation lies in the fact that fire from the ground and from the air complement each other, and make it possible to cover the entire depth of the enemy defense simultaneously.

The final period of the aerial preparation, when the bombers and Stormoviks inflict a powerful blow on the enemy's main line of resistance marks the beginning of an equally close cooperation between aircraft and other types of attacking troops, primarily the infantry.

After the concentrated blow on the main line of resistance there should be no let-up in aerial activity. It must be very intense until the enemy positions are occupied. After that, the possibility of accidentally hitting their own troops requires the fliers to be extremely cautious. Nevertheless, many targets requiring immediate fire from the air may appear on the battlefield. It is up to the Stormoviks to attack with cannon, machine guns, and fragmentation bombs, the enemy infantry and weapons located in the second and third lines and in adjacent communication trenches.

The battle on the main line of resistance requires particularly close cooperation between the air and ground troops. The infantry should use the prearranged signals with precision and indicate its location on the ground. The planes require a well-established system of control, working with the aid of air observers located in advance observation posts.

Continuity of aerial action is of utmost importance. However, the necessity of supporting separate attacking units often complicates the situation, and air units may be echeloned to enable the Stormoviks and bombers to relieve each other incessantly. This facilitates both control and maneuver, and increases accuracy in hitting objectives.

In this type of operation, as in the period of aerial preparation, each type of plane should be given an appropriate mission. While

the Stormoviks support the attacking infantry, the dive bombers attack the enemy artillery and mortars. Other units are assigned to attack enemy artillery and reserves located far from the actual battle. If the situation in the air is favorable, fighter planes may be used in direct support of attacking troops.

The missions of aerial support during the battle for the enemy's main line of resistance and during the exploitation stage are not limited to the battlefield. Part of the air forces should be employed for the isolation of the battlefield, and should attack concentrations of enemy troops preparing for counterattacks or consolidating on successive defense lines. One of the fundamental characteristics of the air offensive is a constant increase in the intensity of aerial action, and the ability to inflict a powerful blow, carried out by hundreds of planes, should be combined with the ability to shift such blows from one objective to another.

The breaching of one fortified zone does not signify a full breakthrough. The areas between the first and subsequent fortified zones may contain defensive positions and obstacles which should be quickly overcome by our troops in order to prevent the enemy from consolidating the new position. In some cases this mission may be carried out by tanks supported by self-propelled artillery.

The activities of the mobile groups will consist of envelopment and encirclement movements, and overcoming of intermediate enemy positions provided with antitank defenses. The tanks and self-propelled artillery advancing over the areas between two fortified sectors will frequently need aerial support. This support may be considered as a continuation of the aerial offensive commenced at the beginning of the attack.

If the air commander is prepared for this task in advance, his cooperation with the tanks will be somewhat different from that established in case of a wide maneuver effected by tanks following a complete breakthrough. The peculiar feature of this cooperation is the necessity of dividing the efforts of the aircraft. Part of the planes will provide direct support to the tanks and assault groups by attacking enemy machine-gun nests and neutralizing hostile counterattacking groups, while the other part will begin attacking the second fortified zone.

Stormoviks are usually assigned to support tanks attacking light fortifications in the depth of the enemy zones. If this support proves to be insufficient, the situation may call for an extensive use of dive bombers. In close cooperation with the assault groups, they can destroy the separate enemy strongpoints which impede the advance of the tanks.

The maneuver of mobile units on terrain saturated with various fortifications is also impeded by enemy counterattacks, which may be launched from several enemy strongpoints provided with special units. The aircraft should aid the ground troops and secure their maneuver by helping to repel these counterattacks. This is undoubtedly a difficult mission but if cooperation is well organized it can be accomplished.

Malaria Control in Mobile Warfare

Digested at the Command and Staff College from an article by Lieutenant Colonel A. W. S. Thompson in the "Journal of the Royal Army Medical Corps" (Great Britain) March 1946.

SICILY was the Eighth Army's first contact with malaria and, even if the training and equipment had been beyond criticism, casualties would certainly have been suffered through inexperience. As it was, later investigation showed that too much of the training had been theoretical. It is felt that one and a half hours at least per week should be included in the training program of all units likely to proceed to malarious areas. This instruction should include the actual putting up of brush-nets and bivouacs, the applica-

tion of repellents important points in the selection of camp sites, etc.

The Anti-Malaria Control Units for the Sicily Operation were thrown together in haphazard fashion. They were formed too late or not formed at all; the personnel were unsatisfactory; they were untrained or wrongly trained; one AMCU (Anti-Malaria Control Unit) lost itself in Tunisia and never reached Sicily; others arrived without officers, without transport, without equipment. When they at last got to work their operations were uncoordinated because the parent formations were constantly on the move and had no clear idea how to employ them. It was soon realized that the only way to use them effectively was to place them under central control at Army, a solution which raised what someone described as "screams of parochial dismay," and a compromise had to be accepted; one of the two units with each division came under army control, the other remained with its formation.

The second season in Italy was far advanced before an effective system for employing AMCUs under mobile conditions had been worked out, and—a much more difficult proposition—put into operation despite the parochial feelings of the diehards.

Sicily and After, 1943

What happened in Sicily may be briefly described.

D-day was 10 July. During the first fortnight there were about 200 cases of malaria due to infection elsewhere. About 23 July, the Sicilian mosquitoes began to take their toll and cases poured into the medical units in alarming and increasing numbers. In the first week in August there were 1,302 malaria admissions, in the second there were 1,819; this latter was the peak. By 3 September, when the invasion of the Italian mainland began, the Sicilian campaign had produced 7,138 cases of malaria and 3,257 "NYD [not yet determined] Fevers"—a possible total of 10,395 casualties *due to malaria.*

The severity of the outbreak caused surprise and anxiety among the staffs at all levels, and unit commanders admitted freely that they had never fully realized the danger, despite the instructions and warnings which had been given.

Sicily left a legacy which contributed very largely to the malaria incidence during the first three weeks on the Italian mainland. Between 4 September and 27 November a total of 15,547 cases of malaria and fevers NYD was admitted to medical units in the Eighth Army, and of these at least 8,000 were due to infection in Sicily. Four weeks after the landing at Reggio there was a dramatic fall in the number of malaria admissions from 1,477 in one week to 523 in the next (week ending 2 October) and thereafter the incidence gradually declined. On the whole the danger was less acute than in Sicily, the season was further advanced, and malaria discipline was rapidly improving.

Sicily was the Jutland Battle of the struggle against malaria in the Italian Campaign Our casualties were severe, amounting almost to a defeat in themselves, but they did not affect the outcome; and thenceforth there was never a time when malaria caused any serious operational embarrassment.

New Weapons and a Fresh Orientation

The fact that in mobile warfare, in particular, adult mosquito destruction is the best method of supplementing personal protective measures was realized long before any practical means existed for putting the idea into effect. The XIII Corps medical plan for the assault on the Italian Mainland laid special emphasis on the importance of spraying out "all tents and all rooms of all buildings within three kilometers" of each unit, using flysol and flit guns. The idea was good but difficult to put into practice, one reason being that at that time—and indeed for long afterwards—too much emphasis was always placed during training upon antilarval measures.

At the end of March, 1944, details of a number of developments which appeared to make possible the destruction of adult mosquitoes on a large scale were first received in Italy:

(a) Power sprayers.

(b) DDT.

(c) Insecticidal "Sparklets," each weighing about an ounce, intended as an individual issue to forward troops.

Small quantities of DDT arrived in April and, in the same month, the first consignment of power sprayers was issued to the Eighth Army. The sparklets failed to materialize and a supply of "Aerosol" bombs was asked for instead; but it was over a year before either of these items became available in any quantity, and they were never employed by British troops during active operations in Italy.

Experiments with DDT as a residual spray in buildings confirmed the claims which had been made for it, and it was quickly realized that a new phase had opened in the battle against malaria in the field. It was estimated that rooms treated in the prescribed manner, using five per cent DDT in kerosene, would remain lethal for about two months to mosquitoes which rested in them. It should be possible therefore, to achieve a high degree of control over newly occupied areas in the minimum of time and, in combination with the usual personal protective measures, this method offered, for the first time in military history, the possibility of really effective malaria control in forward areas.

Air larviciding was first employed in Sicily in the Lentini area; later it was used in many parts of Italy, including the Pontine Marshes, Cassino, Lake Trasimene, and the canal systems near Perugia and Arezzo, but these operations were insignificant compared with the program for the Lombardy Plain offensive in 1945. This included the use of both paris green and DDT. Planning was based on an empirical figure of 30,000 acres which might require treatment, half with paris green and half with DDT. A storage and loading depot was established on Rimini airfield, which included three large tanks with a total capacity of 9,000 gallons connected by a pipeline to a feed pipe near the runway. The DDT solution was mixed by hand in 44-gallon drums, pumped into two small (300-gallon) tanks where solution was completed, and run by gravity into the storage tanks. Paris green and diluent (powdered cement) were mixed in a machine constructed for the purpose by a technician in a soap-powder factory at Cesena, put up in stout half-hundred-weight paper bags and loaded into the aircraft by hand. This depot was capable of dealing with 10,000 gallons of five per cent DDT solution and twenty tons of twenty-five per cent paris green weekly. (The strength of the paris green mixture was later reduced to fifteen per cent as a result of ground checks.) The aircraft were Bostons and Stearmans, flown by American pilots under the direction of a malariologist. The pilots were extremely keen and the organization worked without a hitch. In the first five weeks of the season they laid down about thirty tons of paris green mixture and 50,000 gallons of DDT solution.

Training and Propaganda

Individual training was, on the whole, very successful. The standard of personal prophylaxis bore testimony to this. The one measure which teaching, universally and completely, failed to put over was the use of repellent. To the end of the campaign the prejudice against repellents remained unshaken; it amounted, indeed, to more than mere prejudice; it was a complete lack of appreciation, a rooted and scornful distrust. The average soldier simply did not believe in the necessity for a repellent or that the stuff he was given was of any value, and the majority of officers might have been unaware of its existence. There was something wanting, some fundamental error, in the whole of our teaching about this particular precaution; but one cannot help feeling that there may have been factors involved to which the psychiatrist might have been able to supply the clue.

A great deal of propaganda was devoted to mepacrine, and in the second and third seasons it was obvious that the vast majority of troops were mepacrine-minded and took their daily tablet regularly. In some respects propaganda showed too strong a bias towards suppressive treatment, producing an impression that this was the most important aspect of malaria prophylaxis. By the third season

mepacrine was so firmly established in popular favor that not only formation staffs, but a proportion of the rank and file, wanted to commence it sooner and continue it longer than the dates given by higher authority.

Pure propaganda about malaria, as distinct from teaching, may be directed towards one or both of two objects:

(a) Generally impressing on the soldier the necessity for taking precautions.

(b) Commending to his favor particular devices or courses of action, e.g., the flit gun, care of the mosquito net, the wearing of slacks in the evening.

The first is infinitely easier than the second, and the sign "This is a Malarious Area" was probably as effective in this regard as the most elaborate poster. In general, it may be said that propaganda of the first type was well done and generally effective; of the second it was poor. Many of the official posters were ugly and undistinguished, comparing very badly with, say, beer propaganda in civil life, and most of those produced by field hygiene sections showed more enthusiasm than inspiration or artistic ability.

Episode at Monte San Baigio

At the end of July, 1944, an incident occurred which demonstrated in startling fashion the danger of relaxing malaria vigilance in Italy. It was an object lesson so striking that it produced a salutary effect on antimalaria discipline generally, and may possibly have conferred more benefits in the long run than the injuries it inflicted at the time.

The 56th (London) Division disembarked at Taranto on 17 July after a short spell in the Middle East. Between 21 July and 28 July they moved to Tivoli.

At the end of the first week in August their malaria figures rocketed; from a level of thirty to forty cases per week they shot up to 344 cases in the second week in August, followed by 119 the next week, and dropping back to forty-four cases the week after. The peak was on 9 August, when sixty-four cases were admitted, and the incidence for that week was equivalent to 984 per 1,000 per annum.

The source of the outbreak was not difficult to trace. An advance party of 1,000 which detrained at Itri produced no cases of malaria. The remainder of the division was to have gone by train as far as Palestrina, north of Rome, but, at the last moment, the insecurity of a tunnel caused Movement Control to alter this, and the division left the train at Monte S. Baigio in the marshy district northeast of Tarracina, in one of the most celebrated haunts of malaria in Europe. They remained at the station for upwards of three hours before leaving for Tivoli.

Throughout the division generally, investigation showed that precautions had been lax. Mepacrine had not been properly supervised, and the use of repellent had not been enforced. Indeed, in some units it was not even issued to the men until they arrived at Tivoli.

The crux of the matter was, of course, that Movement Control had taken it upon themselves to alter the detraining station to a place which would not have been selected by anyone who understood the realities of the malaria situation. Nevertheless, even without this alteration cases would still have been caused by mosquitoes entering the train as it pulled slowly through the marshes, especially at dusk, or at dawn. The same conviction arose in the minds of everyone who read the story of the outbreak: any division in Italy at that time might have fared as badly, and the standard of prophylaxis generally must be tightened up.

The Plains of Lombardy, 1945

When the Anzio beachhead at last burst open at the end of May 1944, the malariologists sighed with relief, and switched their attention to that northeastern corner of Italy where malaria has been rife since time immemorial.

The advance was less rapid than was expected. Ravenna was not captured until the beginning of December, and the season was over before any considerable number of troops had entered the danger zone. The ma-

laria organization had been granted a breathing space.

The interval was not wasted. General propaganda and training were purposely withheld until the spring, in order to get the maximum response from an intensive drive at a time when the danger was less remote, but courses for junior medical officers and malaria staff officers were held during the winter, the training of unit squads commmenced in February, and malaria control personnel were given a refresher course lasting for two weeks in March.

Nearer acquaintance with the Lombardy Plain did nothing to allay the anxiety of the malariologists. In the area already occupied there was a considerable amount of flooding, and air photographs showed a great deal more ahead; and it would be an easy matter for the enemy to put vast areas under water by blowing the dikes farther up the Po Valley. The experts made gloomy prognostications about the possibility, if this happened, of the rapid spreading westwards of *A. sacharovi* (*elutus*) from the saline marshes near the sea.

The propensity of *elutus* to bite by day was used as a weapon of medical diplomacy to such effect that when the 1945 season opened the Army Commander ruled that shorts would not be worn in the Eighth Army except for organized recreation. Quite apart from the improvement in individual protection which this order conferred, it had the advantage of impressing on the minds of all ranks the fact that there was an unusual malaria risk that season. It was gratifying to overhear references in the mess to the ferocious mosquito of the Po Valley.

Transmission was not expected to commence until early in May and active breeding was unlikely before the middle of the month. The arrangements for spraying and aircraft control have already been described. DDT spraying was started on 18 March, working first along the main routes in the worst areas, with the object of destroying as many hibernators as possible. Flysol spraying was to commence on 1 May, with a total of twenty-four teams, the personnel of which were used prior to that date to augment the DDT program. This, as it turned out, was a mistake; it would have been better to employ both methods from the beginning, when the greater rapidity of flysol spraying would have achieved a wider slaughter of hibernating mosquitoes. When the big offensive began the flysol teams were gotten on the road as quickly as possible and all were functioning before the end of April. Aircraft larviciding commenced on 15 May, although little evidence of breeding was found before the end of the month.

The Eighth Army flung itself into its last battle on 9 April, and in twenty-three days the campaign in Italy was over. The speed of the advance made it utterly impossible for the spraying teams to keep pace with the forward troops, but they did their best, and the main routes were covered long before large-scale transmission could have commenced. Four British detachments, each equivalent to two Malaria Control Units, were employed on DDT spraying, in addition to the Polish and New Zealand units which worked independently. It was found that one detachment using knapsack and pressure sprayers and employing about 100 laborers could spray about sixty farms daily. Over a thousand gallons of DDT solution were used in the Army area every day.

The final battle of the campaign was over before the malaria season was properly started, although *elutus* in its uneasy hibernation in farms and outhouses claimed some victims. The extra-regimental spraying organization was put to the test of a mobile battle, the ability of the soldier to protect himself was not. When full precautions were instituted it was found that the standard was generally very high, but it must be acknowledged that in the third season in Italy no troops were ever exposed to anything comparable to Sicily in 1943. The malaria risks were probably not as great; the difficulties certainly bore no comparison.

Sea Power Today and Tomorrow

Digested at the Command and Staff College from an article in "The Times" (Great Britain) 7 March 1946.

THE Admiralty, in common with the other naval authorities of the United Nations, is now busily engaged in examining the future composition of the Navy. There was no such problem of comparable magnitude in 1919. No responsible naval officer, in any of the greater navies of the world, then held that the battleships, cruisers, and destroyers of the day were already outmoded and ought to disappear from an up-to-date sea service. No revolution in ship design was yet due, and the questions to be decided were more of numbers than of types.

The soundness of this judgment was vindicated by the experience of the war now just finished. The aircraft carrier was greatly developed in detail and multiplied in numbers; but the battleships, cruisers, and destroyers that fought victorious campaigns under Tovey, Fraser, or Nimitz, though designed on lines already conventional in 1918, proved to be exceedingly well adapted for the needs of 1945.

Curiously enough it is the most remarkable development of all—the atomic bomb—which seems the least likely to affect design radically. The atomic bomb is, in essence, nothing more than "a bigger and better bomb." As such it might be expected to supersede all other bombs used for attacking ships at sea but for the limitation that it is so colossally expensive to produce. Moreover, though one bomb can produce devastation over four square miles of city, that area at sea does not necessarily contain any large number of ships.

The American Navy intends to continue to use warships as targets in further experiments with atomic bombs in order to clarify the data they already possess. But whether the effect on a warship turns out to be, as some prophesy, that the whole of her upper works will be melted by the astronomical temperature generated by the explosion or whether, as others deduce from the survival of many of the reinforced concrete buildings in Hiroshima and Nagasaki, ships of war will survive atomic bomb attack, as they have survived near misses by high-explosive bombs, even of immense weight, in neither case is the result likely to be the disappearance, or radical modification, of any class of warship so far evolved to meet the needs of war at sea.

It may well be that the advance of science and of engineering will make it possible to produce atomic bombs cheaply and rapidly; if this happens, they may displace most other weapons in sea warfare. If they were as cheap and plentiful as hand-grenades, there would be no reluctance to use them freely, even on the least important of enemy ships. Then indeed, if it proves possible for a ship to survive attack by atomic bombs at all, we might see radical changes in the characteristics of warships designed to increase their material powers of resistance to the new form of attack. But these are both still large "ifs."

The development of rockets, however, may work great changes. The design of ships intended to fight one another has been governed, ever since the adoption of steel and steam, by the size and number of the guns they are meant to carry. It needs a big ship to mount big guns, not only because of the weight of the guns themselves and their mountings, but because the structure of the ship must be massive enough to absorb the immense energy of their recoil on firing. But the rocket projectile, being self-propelled, produces no recoil on firing, so that it can be mounted and discharged by any craft with buoyancy enough to carry it.

Thus it was possible, in the allied landings on the Channel and Mediterranean coasts, to produce by means of rockets a volume of fire from a mere landing craft such as could hitherto have been delivered only by a battleship or cruiser. If the hard-hitting

warship of the future—call her cruiser, battleship, or what you will—is required to possess the hitting power of HMS King George V, she need not necessarily today be of the 35,000 tons that ten 14-inch guns demand, nor need she necessarily resemble the conventional warship of the last decade. She will need armor, speed, and high-angle guns—unless they too are replaced by target-seeking rockets—but she may well look much more like an enlarged submarine on the surface than like one of the battleships to which we are accustomed.

The target-seeking projectile would seem likely, at first sight, immensely to increase the efficacy of the aircraft as against the ship at sea. Ships of all classes were sunk by bombs in the late war; but, equally, bombs of all calibers were showered on ships at sea which, like Sir Andrew Cunningham's battleships in the Mediterranean time after time in 1940-41, emerged unscathed without a hit. Even if the proportion of hits to bombs aimed at ships was only slightly increased by the target-seeking device, the efficacy of air attack would be much enhanced. But the target-seeking bomb, like the radio-controlled projectile, is not immune from interference; if it can guide itself on to the target, it may equally be guided by a defender, away from it.

Whatever the technical and material development of weapons in the near or more distant future—even if they are such as to substitute the flying for the floating warship as the combatant instrument of sea power, and we are a long way from that stage yet—the object of sea warfare will remain unchanged so long as carriage by sea remains the only practicable method of moving armies in force, or large quantities and great weights of the sinews of war, about the world. That object is to gain, and maintain, command of the sea, which gives the power to use the sea for one's own purposes and to deny it to an enemy.

The function of all the war fleets in the world is still to keep the humble merchant ship, troopship, or supply ship moving, to protect it from damage, and its voyages from interruption, by an enemy. The composition of those fleets, on the other hand has been subject to continuous modification. Long periods of gradual evolution have been punctuated by the occasional occurrence of radical changes, such, for instance, as from oars to sails or from wood to steel. In recent centuries two great influences—geography and the development of artillery—have combined to bring about a differentiation of warships into battleships and ships of lesser power, a differentiation which survived the two great changes from sails to steam and from wood to steel. The influence of geography has been further profoundly modified by the power mankind now possesses of flying round the world in a few days. Moreover, the evolution of weapons would appear to be now approaching one of its periodical climaxes. It can hardly be doubted but that there will be great changes in the composition of fleets in the near future.

Military Government in Germany

Digested at the Command and Staff College from an article by Major General G. W. R. Templer in "Journal Royal United Service Institution" (Great Britain) February 1946.

MILITARY Government has been defined as "that form of government which is established and maintained by a belligerent by force of arms over occupied territory and the inhabitants thereof." It operates both before and after the end of organized resistance and sometimes remains in effect until a treaty of peace has been signed and ratified, but is more normally brought to an end as soon as satisfactory conditions have been created.

The basic policy was summed up in the Supreme Commander's initial proclamation to

the German people: "We come as conquerors, but not as oppressors. We shall overthrow the Nazi rule, dissolve the Nazi Party and abolish the cruel, oppressive and discriminatory laws and institutions which the party has created. We shall eradicate that German militarism which has so often disrupted the peace of the world."

The conference at Potsdam in late July and early August produced not only an amplification but also a vigorous reinforcement of the earlier generalizations. The purposes of the occupation of Germany by which the Control Council shall be guided were defined as follows:

"The complete disarmament and demilitarization of Germany and the elimination or control of all German industry that could be used for military production.

"To convince the German people that they have suffered a total military defeat and that they cannot escape responsibility for what they have brought upon themselves, since their own ruthless warfare and the fanatical Nazi resistance have destroyed German economy and made chaos and suffering inevitable.

"To destroy the National Socialist Party and its affiliated and supervised organizations."

Finally—To prepare for the eventual reconstruction of German political life on a democratic basis and for eventual peaceful cooperation in international life in Germany.

Of particular importance for the conduct of Miltary Government were the principles of administration laid down. The statement of principles reads thus: "The administration of affairs in Germany should be directed towards the decentralization of the political structure and the development of local responsibility." To this end local self-government was to be restored throughout Germany on democratic principles as rapidly as was consistent with military security and the purposes of military occupation; all democratic parties were to be allowed and encouraged and, though for the time being no central German government was to be established, certain central German administrative departments, headed by State Secretaries and acting under the direction of the Control Council, were to come into existence.

Administrative Policy

The present general administrative policy is one of building from the ground up, with a corresponding limitation of the powers of Germans at the higher levels. It is hoped that in this way a large cross section of lower level administrators will acquire both experience and self-reliance. This whole policy runs counter to the German tendency to impose an elaborate, theoretical, authoritarian system from on top. Admittedly we control the German administrative machine, but we control it rather than operate it. This policy of indirect government is not only desirable but inevitable. Our lack of numbers alone is enough to compel us to adopt this policy. It follows, too, that Military Government deals primarily with the senior German officials rather than the lower officials and the citizens themselves, and that Military Government officers at lower levels function essentially as checking agencies rather than as administrators in the ordinary sense.

Even before the Nazi regime had added a huge parallel administrative structure based on the party *Gau*, the German system of regional and local government was already a complex one. In Prussia, for instance, even after the virtual abolition of the Prussian State Government, there remained five levels of government.

In the spring of 1945 the whole of this elaborate structure and its incorporate systems collapsed. The great machine which but a short while before had controlled so thoroughly the whole life of the German nation not only ceased to function but disappeared almost entirely. It is true to say that in most places there was no local administration functioning when our troops took over, and Military Government had to build up the entire machinery afresh.

At the time of the capitulation, the zone which had been occupied by the twenty-first

Army Group can justly be described as an administrative desert. Generally, the machinery of civil administration had ceased to exist. The police forces had disintegrated; law and order were nonexistent; the civil medical services had broken down, except in so far as individual efforts were concerned, and the reporting of communicable diseases had ceased; there were no postal or telephone services; not a school was open; food collection and distribution had stopped; the banks were closed; there were no courts working, even had there been any method of bringing offenders to book; there was no distribution of any essential commodity such as fuels for power stations; public utilities such as water, light, and sewerage were mostly a thing of the past; there were no rail services and there was not a civilian vehicle on the roads, except those commandeered by the displaced persons; and finally, there were 2¼ million of these slave workers milling about in every direction, drunk with their new found freedom.

Denazification Policy

Denazification policy has been laid down in broad terms in the Potsdam Agreement, and a directive embodying the terms of this agreement has been carried out in the British Zone. The denazification policy as set out in this directive is put into effect by Military Government personnel in detachments at *Kreis*, *Regierungsbezirk*, and province levels, by officers in the various Headquarters Sections of the Control Commission engaged in the reestablishment of industry and by Special Branch officers of the Public Safety Branch.

Frequently the removal from office of a Nazi who is thoroughly trained in his work results quite naturally in a temporary, if local, decrease in efficiency, but such consequences have to be accepted, and the principle is rigorously maintained that the Nazi must be replaced by the anti-Nazi, even if the latter is less efficient.

The whole task of denazification is one which calls for unremitting energy and a steady refusal to compromise. To those who still see persons in office or positions of influence who had strong Nazi sympathies or Party ties—and nearly every German knows of someone at whom he can point—our system appears perhaps both slow and patchy. But as the work goes steadily forward, many of these early critics are being gradually brought round to the view that "Slow but sure" is no idle phrase where the British are concerned, and that there is indeed a wide plan in operation rather than a capricious and fitful elimination policy.

Law and Order

Quite apart from all considerations of local, regional or zonal organization, politics, and the development of local government, there are two main things which have to be achieved and without which all else is lost effort. Military Government is dependent, like any other government, on the establishment and maintenance first, of law and order; second, of material sufficiency and some sort of working economy. The first is the great *sine qua non* and the second is dependent on it.

The first is really a twofold matter: there is the establishment of civil order—public safety and the reestablishment of a valid police and legal system—and then there is the overcoming of resistance and overt and covert attempts to continue the war. To deal with the former side, as might be expected, the crime wave was high in the period following the entire physical and moral breakdown of defeat, particularly in crimes of violence, thefts and sexual offenses. These, though still high, show a considerable decrease, and this decrease is due to some extent, to the following causes: the return of foreign displaced persons to their own countries, the exemption of police from curfew restrictions and the strong counteractions being taken by Public Safety and the police reinforced by Army personnel. The crime total for September was nearly seventy thousand including over ninety cases each of murder and rape and 900 robberies, and nearly a third of all cases resulted in detections.

The Legal System

On our initial entry into Germany all the German courts were suspended by Military Government law; certain Nazi laws were also abrogated, and all German law which by its application would cause injustice or inequality was suspended. Since the purging of German legislation is a long and very large task, it was decided to dissolve certain special and Nazi Party courts and tribunals, and to suspend only temporarily the ordinary and administrative courts until they could be reopened with a staff which could be trusted to carry out our policy of denazification of German law and German legal personnel. So far, we have found that all German lawyers are applying Allied policy scrupulously. Two-thirds of the total number of courts which it is intended to reopen have already been opened, and in this connection the main difficulties have been the finding of suitable accommodation and capable judges, prosecutors and other legal officers, since no Nazi, unless only nominally a party member, is allowed to hold any appointment or practice in the courts. The main difficulty on the British side is the lack of qualified British lawyers to carry out the work which is of the most varied character and of such importance both to Military Government and ultimately to Germany itself.

Basic Needs

We all have to have a roof over our heads; we have not only to conserve bodily warmth with clothing, we have to add to it with food internally and with fires externally both by direct heating and by the cooking of food.

The program of movement of all essential commodities such as coal, sugar beets, and building materials is centrally planned and given to the German transport authorities who are responsible for its execution. Coal is by far the largest item and it is a constant struggle to move more and more. We are now moving nearly 140,000 tons a day, but transportation facilities will of necessity remain the bottleneck for some time. The limiting factor in this instance is availability of rolling stock, and this in turn is aggravated by a lack of repair facilities. It is no exaggeration to say that the whole economy of Western Europe at this time is conditioned by our ability to obtain more railway wagons.

Food and Agriculture

Agriculture in Germany had been brought to the highest pitch of production, and two main factors contributed to this: the liberal use of artificial fertilizers and the employment of a great labor force—largely foreign labor. But the distribution of fertilizers declined after 1942 and the land became increasingly impoverished; with the occupation, moreover, the foreign labor ceased to be available and essential cultivation during the first two months was seriously affected. The employment of demobilized ex-*Wehrmacht* members did, however, provide sufficient labor to gather last year's harvest.

The population is classified into consumer groups according to age and occupation, with a ration scale, for each group, *e.g.*, children of various age groups, normal consumers, heavy workers, miners, expectant mothers. Difficulties of food supplies and distribution result in regional variations, but the daily calorific average for the zone is about 1500; and there is no chance of any increase in these figures for the urban non-producer during this winter. Perhaps it can be more readily appreciated what this means if I point out that 2,000 calories a day is the figure recognized by the Allied nutritional authorities as that below which health cannot be maintained, and that the lowest average in England has been about 2,800 calories with the points system in effect.

The clothing and textiles position is as follows: the provision of clothing for ordinary civilians has been regarded as the lowest priority in view of the large requirements of displaced persons, essential workers, public services, and prisoners of war. It is quite certain that practically nothing can be produced in the way of new clothing for Germans within the next six months. Those German civilians who have no reserve of clothing or bedding will be exposed to

considerable hardships. Several clothing levies—heavy ones, were made in the early stages of the occupation, and now another one has had to be made on the civilian population to help provide for the priority needs just mentioned.

Housing and shelter also fail to provide a rosy prospect. Of the five and a half million dwelling units in the British Zone (there was, incidentally, a considerable housing shortage before the war), less than half remain undamaged and, of the rest, two million are written off as destroyed. This leaves over a million dwellings needing repairs, and the amount of reconstruction needed is so vast that only the most urgent work of this kind can be done in the first two or three years. Meanwhile emergency repair to houses is being treated as a military operation. But here again we come up against the familiar limiting factors—coal to make materials, transport to move both materials and coal, and labor. At present, new construction is virtually forbidden and it is quite clear that the long-term building program will have to be controlled in all its aspects.

State of Public Utilities

The general state of public utilities bears equally upon housing conditions and health. There was, of course, very extensive damage to water and sewage systems in most of the large towns, and immediate repairs were carried out to avoid disease and epidemics. As a result, there have been practically no cases of water shortage and comparatively few cases of typhoid. The long-term policy of reconstruction, however, will take a very long time. Gas mains were very severely damaged by air attacks and land fighting, but considerable progress has been made in restoring supplies. The German electrical power system was almost completely out of commission, and the whole network of power lines, cables, pylons and sub-stations had suffered severely. But the problem was tackled energetically and the system throughout the zone is already working reasonably well.

The only real guarantees against epidemics are adequate food, fuel and shelter, and the Medical Organization is well aware that it can only mitigate the effects of the lack of these things. Above all, there is the danger of serious outbreaks of epidemic disease. The German Public Health system collapsed with the rest of the Nazi machine, and rigid denazification accounted for much of what was left of the health administration, but the gaps have now been filled.

There is something of a surplus of doctors now in practice in the zone, roughly one to every two and a half thousand of the population, and medical personnel on hospital staffs are adequate. There is no overall shortage of nurses, but not enough of them are fully trained. German production of essential drugs is progressing, but slowly—again on account of the difficulty of coal supply, skilled labor and transport.

Politics

It comes perhaps as little of a surprise to you when, turning from the dismal economic aspect to the cultural and spiritual side of life in the zone, I say that party politics these days mean little or nothing to the vast majority of Germans. If life were simpler, if housing, food, clothing and work did not present such immediately pressing problems and he had more energy to spare, the German might take a much more active interest in the renewed political freedom offered him.

For some time after the occupation it was doubtful whether the "old" parties would revive, but now it is clear that at least two of them are properly back in the field—the Social Democrats and the Communists, and that the place of the largerly denominational Catholic Center Party has been taken by the deliberately more broadly based, generally middle class, Christian Democratic Party. You are too familiar with the first two parties for me to say much of them. The Christian Democrats, who are strongly represented in the Rhineland and Westphalia and have been the latest to organize themselves, have recently shown considerable activity and extended their influence.

In spite of all the activities of the various

parties, however, it remains true to say that German politics give an impression of unreality. The vast majority of Germans are still apathetic, and the policy of Military Government, in not allowing opportunists to trade on popular apathy and acquire political powers out of all proportion to their representative importance, is undoubtedly in the truer interests of any German democracy than would have been the early granting of complete political freedom and the premature holding of elections.

Displaced Persons and Refugees

I am now coming to the end of what I have to say, but before I come to my general conclusion there is a very important branch of our work in which a vast amount has been done, much of it most unostentatiously. I refer to the work carried out in connection with displaced persons, prisoners of war and refugees. Our accepted principle is that there is no such person as an unrepatriable; repatriation is merely a question of time. By the end of October 1945 well over one and a half million displaced persons had been repatriated, including over 900,000 Russians. That left over half a million in the assembly centers, the vast majority of them Poles.

It is our endeavor to give displaced persons a higher standard of food and clothing than that of the Germans. Available imported clothing is being supplemented by the clothing levies already mentioned. Their daily ration averages 2,200 against the German average of about 1,500 calories, and this includes Red Cross parcels. Extra milk and suitable baby foods are provided for expectant mothers and children.

Nearly every camp with children now has its own school, and 200,000 text books in appropriate languages are being printed. Many camps have their own workshops. Ten per cent of all seats in German Universities have been reserved for displaced persons, and in addition it is proposed to start two "Camp Universities." After due screening, ex-inhabitants of concentration camps will get priority of employment and accommodation, extra food, clothing and financial aid. The main tasks in the camps are those of reducing overcrowding, increasing privacy for families and space for recreation.

The refugee and evacuee problem is one of great dimensions. The allocation of responsibility for all these refugees has now been agreed upon, and whereas the British Zone is to accommodate one and a half million of them, the Soviet Zone is generously accepting the heavy commitment of two and three-quarter millions, the American Zone two and a quarter millions, and the French Zone 150,000.

Conclusion

What are the Germans thinking of their present and of their future? Many look for the reasons for their lot in the deeds of others, but few admit their own responsibility. While as a nation they still undoubtedly feel no sense of guilt, and fail to realize that they themselves are responsible for the government they chose, all are beginning to realize what total defeat really means, what their adventure really cost them, in lives, in their best manpower; in national wealth, in industry, and all forms of great industrial capacity. They know well that they have lost more than the work and wealth of a whole generation, and whoever among them is to blame, they must pay, each one of them. Many among them, perhaps too close to defeat to see things clearly, feel that this time the gigantic gamble has been so great as to wreck their national future for all time. One thing is certain, whatever we may do to help them towards sanity and normality of living, is that their future lies in their own hands and they themselves must work at it.

I have purposely confined my survey of Military Government to the British Zone. Time will not allow that I should cover the wider problems of the government of Germany as a whole by the four powers represented on the Control Council. It is, however, right that I should remind you that there is this wider picture, that we look upon our task as something more than a zonal one and feel that we are helping to shoulder our re-

sponsibilities for the sake of Europe as a whole, as part of an attempt to restore something of our great common heritage which was so nearly swallowed up in disaster. And that is why it is no exaggeration to say that many of those now in the zone have something of a sense of "mission," and, though in many cases the results of hard work are scarcely apparent to the doer, there is some sort of trust that the effort is not lost.

The Conquest of East Prussia

Digested at the Command and Staff College from an article by Major W. R. Young, Royal Artillery, in "The Army Quarterly" January 1946.

THE Russians reached the East Prussian frontier on 17 August 1944, crossed it on 23 October (but did not get very far), launched their final assault on 19 January 1945, and were still fighting Germans on East Prussian soil on 8 May 1945. This timetable makes a dull showing, but when two powerful armies are engaged in battle we must expect a sticky kind of game, instead of the spectacular passing movements and brilliant cuts-through which characterize a contest between uneven sides. It will be remembered that Rokossovsky and Koniev were stopped on the Vistula line at the same date as Cherniakhovsky halted on the East Prussian border.

Zakharov, indeed, whose army was operating in the area between Warsaw and Grodno, did not share in the general respite, for he continued to fight his way forward and established himself on the line of the river Narew in early September. Then, he too, settled down to wait, with two bridgeheads secured over the river.

The next move in the approach to East Prussia came from the north when Bagramyan launched a strong offensive which carried him across half Lithuania to the Baltic on 10 October. By the 23d of the month his troops were lining the north bank of the Niemen from its mouth to Jubarkas, which is forty-five miles east of Tilsit.

The October Attack

On that date was announced the invasion of East Prussia by Cherniakhovsky's army of twenty-six infantry divisions supported by powerful artillery and tanks. This force captured sixteen towns and over 900 "populated places," which were, presumably, the fort-like farms and hunting lodges, which are characteristic of East Prussia.

Many have wondered why this great attack was delivered in isolation when Bagramyan in the north and Zakharov on the

southeast were admirably placed to converge on the enveloped province. But the truth seems to be that an assault was launched from the southeast, but that it failed.

The October invasion, then, achieved very limited results. Cherniakhovsky had pierced the forward edge of the eastern defense sys-

tem and, in one area had penetrated it to a useful depth, at Goldap. But Zakharov was still on the Narew.

And then, on 17 January 1945 Marshal Rokossovsky, who had taken over command of the Narew front in November, broke out from his bridgehead and captured Makow and Ciechanow on the road to Mlawa. At the same time his westward thrust parallel to the Vistula had the double effect of guarding Zhukov's flank, and of confusing the Germans defending the southern frontier of East Prussia; but his most rapid progress was made in a northwesterly direction. Prasnyz fell on 18 January and Mlawa and Soldau on 19 January.

On that day Cherniakhovsky completed a breakthrough from the east and occupied a number of townships, all north of the Gumbinnen-Insterburg railway, and his most westerly capture was Ragnit, seven miles from Tilsit. On the 20th he took Tilsit and Kaukehmen, which is fifteen miles farther west. The list of his early captures, indeed, suggests that Cherniakhovsky's command had been extended along the north bank of the Niemen—the front which had failed to support him in his October attack.

Thus, on 19 January, began a campaign which was destined to drag on for more than three months.

Exterior Lines Strategy

The military student cannot afford to ignore this campaign, since it provides a clear example of exterior lines strategy in a theater which has hitherto been historically associated with the brilliant exploitation of interior lines. And, if there was nothing comparably brilliant in the Russian operations of 1945 their strategy was, at any rate, supremely—even exaggeratedly—sound. The mistakes of 1914 were avoided and every necessary step was taken to counter the Schlieffen plan, which had been laid down as the book answer to the invasion of East Prussia by Russians.

That plan was based on the fact that the long chain of the Masurian Lakes, stretching in a half-cirle fom Angerburg, thirty miles south of Insterburg, right round to the southwest corner of the province, was a natural obstacle to joint action by Russian armies invading from the east and from the south. In 1914 Rennankampf advancing westward on Insterburg had been met by a strong, though inferior, force of Germans at Gumbinnen, where a battle was fought on 20 August. It was, in fact an indecisive battle, but it alarmed the German commander, Prittwitz, who at once ordered a retreat to the Vistula. His staff, however, persuaded him against this course and made instead a rapid transfer of forces to meet the army of Samsonov which was approaching East Prussia from the south. This concentration of troops, brilliantly handled by their commanders, destroyed Samsonov's army at Tannenburg on 27 August and then regrouped to meet Rennankampf. On 10 September it defeated Rennankampf almost as decisively in the battle of the Masurian Lakes, where a frontal attack on the Insterburg-Angerburg line was combined with turning movements through and around the lakes by way of Lötzen and Lyck.

The story of this campaign has been repeatedly recorded, and it has, no doubt, rankled in the minds of the Russian General Staff. In 1945, therefore, there were to be no mistakes. Cherniakhovsky's attack from the east—and north—was synchronized with Rokossovsky's advance from the south, and, whereas in 1914, seven days had separated the battles of Gumbinnen and Tannenburg, in 1945 both these towns fell *on the same day*, 21 January. On the 22d Rokossovsky was already reaching out a hand toward his neighbor when he sent a force, mainly cavalry, to seize Allenstein, north of the line of lakes; and within the next two days he brought fresh troops into action to extend his attack all along the southern frontier to Lyck. Cherniakhovsky, meanwhile, had secured the gap between Insterburg, taken on the 22d, and Angerburg, taken on 24 January, and on the 26th he captured Lötzen. On 27 January these movements bore fruit and the linked armies pierced the whole line of the Masurian Lakes defenses.

Thus joint action had been assured and the bogey of 1914 had been laid. But the Russians of 1945 were not content with this. Already on 26 January Rokossovsky had driven through to Marienburg on the western border of East Prussia and to Tolkemit on the Frisches Haff. So there was no question this time of the Germans retreating behind the Vistula as Prittwitz had wanted to do in 1914. From 27 January to 1 February violent counterattacks were made by the Germans in the area northwest of Allenstein but the attempts to break out of the sack, whose base was represented by the line advancing through the Masurian Lakes, all failed against the double barrage which Rokossovsky had established on either side of Elbing. And when, on 10 February, he captured Elbing itself the Germans realized that the barrier was too strong to be broken. Henceforth they sought their escape routes in the area west of Königsberg, which gave access to the sea and the Frische Nehrung.

Liquidation

But the strategic picture of the campaign can never do justice to the troops who have to execute the plans, and this is particularly true of the operations inside East Prussia, since the province seems to have contained some of the strongest fortifications and defense lines in the world.

Rows and rows of continuous trenches, studded with concrete, and strongpoints protected in front by minefields, antitank ditches, dragons' teeth and wire, and supported in rear by rows of pill-boxes and *"panzerwerke"*—all these would form but one of a series of defense zones which succeeded each other to a depth of seventy-five to one hundred miles.

We go back, therefore, to our sack whose northern end was secured on hamlets in the Samland peninsula northwest of Königsberg, and whose southern end rested on Elbing and the shore of the Frisches Haff.

During February the troops forming the base of the sack steadily advanced northwestward, forcing the Heilsburg-Wormditt positions and reached the Haff on 15 March, thus splitting the enemy forces grouped southwest of Königsberg. Very fierce fighting took place in this area, but eventually a large German force was cut off in the headland which juts out some twenty-five miles from the capital and the tale of German losses from the 13 to 29 March added up to 80,000 killed and 50,000 captured.

The storming of Königsberg itself began on 8 April. Simultaneous assaults were launched from the southwest and the northwest and the fortress capitulated on 10 April yielding a haul of 92,000 prisoners.

Those who escaped from Königsberg conducted a fighting retreat along the road leading to Pillau, but once again a sizable force was trapped in a headland, southeast of Frischhausen, where over 14,000 prisoners were taken.

This brings us to 17 April, and there is not much more to add, except that those Germans who attempted to escape by sea were harried by the Baltic Fleet Air Arm as well as by ships of the Baltic.

Pillau fell on 25 April and the Russians crossed over to the Frische Nehrung in pursuit of the tiny remnant of the East Prussian garrison. But along that narrow spit we will forbear to follow them, for 25 April also saw the encirclement of Berlin and the link up of East and West at Torgau. The War was over—bar the counting.

Officers are now as never before required to know how to train and educate effectively their subordinates. Now all officers and generals must master to perfection the art of training and educating troops in peacetime conditions.

Generalissimo Josef Stalin

Close Combat *

Translated and digested at the Command and Staff College from a Russian article by Colonel General N. Chibisov in "Krasnaia Zvezda" (Red Star) 7 March 1946.

THE experiences of the recent war have conclusively confirmed the fact that close combat is the most difficult form of action required of military forces. Success here was determined, above all, by effective cooperation on the part of the infantry, with artillery, armored forces, aviation, and engineers. A high order of tactical training on the part of all arms and services, and particularly skill in close combat, insured success in the most complicated operations.

Modern close combat pertains not to infantry alone, but to other arms as well. It is the most important stage of modern battle, the stage in which the issue of every battle is decided. In the case of the infantry, close combat begins at the moment when it begins its struggle with the enemy, by means of its own weapons—machine guns, submachine guns, rifles, and hand grenades.

In close combat, which begins usually at distances of from 300 to 500 meters, the infantry is most important. Its principal types of action are attack and defense. This holds true for all types of situations—whether the infantry is attacking the enemy's positions, repelling enemy attacks or counterattacks, or is engaged in combat in villages and towns, etc.

This fighting is characterized by intenseness and violence. It does not develop evenly. Varied situations arise, one form of combat being rapidly replaced by another, depending on the action and fire of the enemy—attack, defense, a rush ahead, a counterattack, encirclement, breaking off of this action and, again, attack.

The tendency to reinforce the infantry with automatic weapons, close-support guns, and engineers is based on the desire to insure the accomplishment of the infantry's principal and most difficult mission—the destruction of the enemy in close combat. This is also the aim of all the other various arms—artillery, armor, aviation, engineers, etc. The intenseness of close combat in the breakthrough of an enemy defensive position depends on the thoroughness of the preparation of the infantry and tank attack by artillery and aviation, and the support they give them in the depth of the defense area.

The importance of artillery in the support of close combat in attack and defense is generally known. It is also generally known that, in accordance with the type of support it renders in offensive operations, artillery may be divided into two types—general or direct support artillery, and close support (regimental) artillery.

Field artillery supports the infantry primarily by massed fires. It destroys the enemy's weapons emplacements and personnel, silences his artillery and mortars, shells his reserves; and interferes with the normal functioning of his headquarters, activities in his rear areas, and his command and observation posts, thus isolating the field of close combat. A density of 200 to 250 guns and mortars per kilometer of front permits the simultaneous suppression of the entire depth of the enemy's main zone of defense, thus insuring freedom of movement for the infantry and extending its range of action. This type of artillery cooperation with the infantry is organized and effected on the basis of the following teams: company—battery, battalion—artillery battallion, regiment—artillery group.

The close-support artillery silences those weapons emplacements that the field artillery, using indirect fire, has not succeeded in destroying. The most important requirement in this method of dealing with the enemy is speed in opening fire and neutralizing the target. As it moves ahead, the infantry encounters objectives of varied character, and calls for guns of various calibers for overcoming these. Though in attacks under field

* The Red Army uses the term "close combat" to include all types of action which take place while in actual contact with the enemy.

conditions the majority of missions may be accomplished by pieces ranging in caliber from 45-mm to 76-mm, in combat in villages and towns the need sometimes arises for more powerful guns, up to 203-mm inclusive.

Experience shows that close-support guns must be used in pairs; one gun of the pair remains in position and, like a hunter on the watch, stands ready to destroy any target that appears while the other is on the move. If the attacker has, let us say, twenty such guns per kilometer of front (and this can be regarded as a mean norm), it is necessary to reinforce the rifle company with two to four guns. Cooperation is organized and effected between rifle platoon and artillery section (one gun); rifle company and battery or platoon (two guns).

Likewise, in accordance with the character of its cooperation with the infantry in defensive action, we may also divide the artillery into two types: one conducting indirect fire and the other employing direct fire from previously prepared positions against tanks and infantry. The first of these types of artillery employs massed fires. Its principal task is to bring down concentrated fire on the masses of enemy infantry and tanks in their assembly areas and on the line of departure, and standing barrages at the time of the attack; and to destroy the enemy's units which have managed to break through, to isolate these forces from the following waves. The organization and application of the joint efforts of the artillery and infantry is effected in the teams: infantry battalion-artillery battalion, infantry regiment-artillery group.

The artillery employing direct laying against tanks and infantry from previously prepared positions (in the antitank centers and areas) enters into combat only upon the approach of tanks within the effective range of the guns. Cooperation must be organized between rifle squads and individual gun, rifle platoons and artillery platoons, rifle companies and batteries.

The role of tanks in close combat is unquestionably a very important one. The fundamental mission of the tanks is to support the advance of the infantry through the whole depth of the enemy's defensive position by means of their fire and maneuver. In the accomplishment of this mission they destroy enemy personnel and armored forces, neutralize enemy weapons that interfere with the advance of the infantry, and demolish antipersonnel obstacles. The place of tanks in the battle formation depends on the system of antitank fire employed by the enemy, the presence of antitank obstacles, and on terrain conditions.

Experience shows that tanks must not separate themselves from the infantry by more than 200 to 400 meters during the period of close combat. In difficult terrain and in the presence of formidable fortifications, the tanks will usually operate with infantry waves. Only after the infantry makes its way through tank proof areas and makes paths through obstacles, are the tanks able to push out and move ahead. In operations in wooded areas, tanks as a rule must advance with the infantry, from fifty to 100 meters behind their leading elements. Each tank should have a detachment of infantry and engineers, whose commander is to be responsible for the protection of the tank from enemy soldiers armed with antitank weapons and for clearing paths through antitank obstacles.

Under the diverse conditions of offensive combat the character of the action and the cooperation of tanks with infantry and other arms will not always be the same. Under all conditions, however, it is necessary to coordinate the combat action of tanks with the efforts of infantry, artillery, and engineers. The infantry, operating together with the tanks, follows resolutely after them and, with all the power of its fire, neutralizes the enemy's antitank weapons, reconnoiters and neutralizes mine fields, and helps the tanks to cross antitank obstacles.

The place, significance, and missions of the engineers in close combat were accurately established by the experiences of the recent war. Suffice it to say that in the breakthrough of a fortified zone, close combat begins with the clearance of passages through

obstacles. Later on, engineer units accompanying other types of forces, insure a rapid advance through the main zone of the enemy's defensive position, which is saturated with obstacles, including land mines in roads, and cut up with trenches.

In breaching fortified zones, in attacks on towns and villages, in assaulting permanent weapons emplacements or buildings adapted to defense, the operation is conducted by means of assault groups in which engineers must be included. The participation of engineers in the consolidation of terrain that has been taken from the enemy, is mandatory. Here a great deal depends on the speed with which obstacles (antitank and antipersonnel mines, concertinas, etc.) are installed.

Regarding the employment of support aviation in close combat, it is very important that all flying personnel taking part in the action should accurately know the terrain lines held by their infantry, the location of objectives that must be suppressed or destroyed, and the signals for mutual identification and target designation. Infantry officers, on their part, must always be prepared to indicate the position of their units by means of signaling equipment especially prepared for this purpose. They must also be able to indicate to the supporting air force, by means of predetermined signals, targets that must be immediately neutralized, thus taking advantage of the presence of their aircraft to accomplish their direct mission. Perfect knowledge and correct employment of the signals for mutual identification and target designation on the part of both aviation and infantry is the basis of successful joint action.

It is quite necessary that there should be a liaison officer with a radio, close to infantry units engaged in close combat. The infantry officer in charge of the close combat must have direct contact with the air liaison officer and direct the support aviation through him.

It has already been noted that coordination between the efforts of the infantry and those of all other arms engaged, is an important condition for success in close combat. Cooperation is set up not only in the division and regiment, but also in the battalion, company, platoon, and sometimes even in the squad (for example, the tank squad).

In the first place, it is required that all commanders, and particularly commanders of companies and platoons, be acquainted with the plan of battle (where, when, who, and what). Those who are the direct executors of this must study the plan with special care. The commander of the company, of the platoon, of the squad, the commander of the gun, the entire crew of the tank, should know accurately the mission of the platoon —of the tank, and of the infantry it supports. Especially important are the agreements relative to location and displacements of observation posts, and the fixing of signals relative to cooperation in accordance with time and terrain lines; also the presence together, or at no great distance from one another, of those commanders who work out their common mission together. Agreements relative to matters of cooperation should be known to both first and second in command, in case the commander should become a casualty.

To insure success in close combat, the organization of cooperation within infantry units in both their departure positions and over the entire depth of their assigned mission is equally important. For this reason it is necessary to indicate clearly the proper place in the battle formation for machine guns, mortars, and accompanying guns, the time and sequence of displacement, and their fire missions, in order to avert their lagging behind by the beginning of the period of close combat or during its development.

The morale of troops is of enormous significance in close combat. Each soldier should be imbued with determination, firmness, tenacity, and a spirit of self-denial.

The training of infantry, therefore, should tend to inoculate it with customary modes of action (brought up to a state of automatism) in the taking of obstacles, firing on the move, crawling, advancing by bounds, throwing

grenades, combat fire, hand-to-hand fighting, etc. All this should be accomplished in separate, independent classes. The instruction and training of tank crews in the technique of driving tanks, the overcoming of antitank obstacles, direct firing without halting, must be carried out in specially arranged training periods for tankmen. During this period of training in the technique of close combat (before the beginning of the joint training), the officers should study the combat peculiarities and capabilities of the cooperating types of forces. For example, the officers of the infantry, artillery, and engineers study the tanks; the officers of the armored forces, and engineers study the combat peculiarities and capabilities of the infantry and artillery, etc. For this purpose, joint classes should be organized for officers of the infantry, artillery, armored forces, and engineers. Before the joint classes begin, the senior commanders conduct demonstration exercises.

The elaboration of the technique of close combat must be carried out in independent classes. In the joint tactical exercises main attention must be given to the question of combat cooperation among the infantry, armored forces, accompanying guns, and engineers in close combat.

In summary, to perfect their skill in close combat, troops should be instructed and trained principally in the execution of attacks and the repulse of enemy counterattacks under different combat situations and conditions of terrain. This includes of course, such actions as assault operations against various types of fortified structures; combat in villages and towns; combat with tanks, self-propelled guns and enemy infantry. It is no less important to train troops in the execution of raids on enemy infantry, tank forces, artillery, and other targets, especially at night.

The separate classes and joint classes in close combat must of course be conducted in a specially prepared site. It is therefore necessary to organize training areas in the various units which have been duly prepared and which will reflect and reproduce the principle variations of close combat. The main equipment should consist of the installation of the most typical of permanent structures, a system of trenches, communication trenches, antitank and antipersonnel obstacles of various types, fortified ruins of buildings, and other types of structures.

Area Warfare

Digested at the Command and Staff College from an article by Brigadier J. M. Calvert in "The Army Quarterly" (Great Britain) January 1946.

THE normal object of a commander in war is to destroy the enemy forces opposing him. One of the methods, though not necessarily the only method, of achieving this is to hamstring the enemy forces, thus destroying the means whereby he fights. This includes destroying his bases where he has collected reserves of material, destroying his main headquarters—the nerve centers which coordinate all his movements—and cutting off his main forces from his means of supply.

Until a few years ago armies fought only in two dimensions. Commanders used to maneuver to achieve the above results as a fencer or boxer maneuvers in order to get through or around his enemy's guard and get at his body.

In modern European warfare, another method of achieving this end is to deceive the enemy as to where our forces are going to strike, and then strike hard with all the forces at the commander's disposal, to pierce the enemy's guard and then get at his bases. The more mechanized and industrialized armies get, the more vulnerable they are to this form of attack.

With the advent of third-dimensional warfare, an opportunity is given to commanders

to outflank their enemy from the air. Airborne forces on the European front were used mainly as a means of crossing an obstacle, and were used tactically rather than strategically, except for the outstanding example of the Eindhoven-Nijmegen-Arnhem operations. Here a bold, resolute maneuver nearly succeeded, and in fact was seven-tenths successful, if the capture of bridges was the yardstick. Too many people remember the gallant failure at Arnhem and forget the successes at Eindhoven and Nijmegen.

Long before Arnhem, General Wingate, under the orders of General Slim, had used his airborne forces in a strategic role. In this case we had complete air superiority and it was possible to land large numbers of troops, totaling 18,000 with artillery, behind the enemy lines.

Turning to the Pacific theater, The Australians and Americans employed this strategic method of using airborne forces with complete success at Wau and had further successes near Lae and Salamua.

In the last stages in Europe, a magnificent plan was being studied for the employment of airborne forces in a strategic role to penetrate the "Festung Europa" but, owing to the rapid disintegration of the German Armies, the plan was stillborn.

Allied gliders landing in Germany. (U.S. Army Air Forces Photo.)

In the European theater the main difficulties after obtaining air superiority were in supply and in putting down sufficient weight of material in tanks and guns to withstand the enemy's counterattacks with all weapons. In Asia there was no such difficulty as first of all the enemy did not have many tanks or guns, therefore it was nearly always possible to learn where they were, land elsewhere, and then advance on the objective. Sec-

ondly, due to air superiority, the great distances involved and the difficulty in deploying technical equipment, such as radar, to aid in the defense interception was more difficult and supply was comparatively easy by air.

It is questionable whether using airborne forces tactically, which entails dropping them on top of the enemy, is sound. Losses are invariably high, and there are only a few places along the opposing fronts in which this can be done. As the enemy can forsee these points, surprise is difficult and antiaircraft artillery can be concentrated around possible landing areas. The force must be overrun in a short time because of its lack of heavy weapons. This all ties the hands of the commander of the ground forces, with the result that the airborne forces may become a liability to him rather than an asset, and he becomes chary of asking for their support.

The ideal then would be to land in a strategic area behind the enemy, ten, fifteen, or twenty divisions complete with sufficient strength in matériel not only to defend themselves but to make their presence there offensively worth while as part of a great cutting off or outflanking movement—and then to keep them supplied. It would probably not be necessary to have a whole force parachute trained, as the first object would be to seize a number of airfields and then hold them until transports could land heavier weapons and stores and more reinforcements. With regard to supply, in the future there should be no difficulty in supplying airborne forces by the use of an adapted V-1. An automatic photo electric fuze could be adapted to make a parachute release to break the fall of the supplies.

Direct air support in the closest cooperation with ground forces can to a great extent take the place of artillery support if the lessons of all theaters of war are properly studied and adapted. In southeast Asia and New Guinea, owing to the great difficulty of bringing up heavy artillery or obtaining naval artillery support, the tactical, as opposed to technical, development of very close air support in lieu of artillery had reached a far higher development than in any other theater of war.

This close air support should be an intrinsic part of any airborne operation, as it is only by this means at present that one can give the ground forces adequate support, unless as was done in the Rhine crossing, the airborne operation is so close to our own ground troops that long-range artillery can do it. At Arnhem preliminary arrangements for air support were far from perfect. This had a direct effect on the amount of air support provided and the time it took to provide it.

The great captains of war in the past would be exceedingly envious of the tremendous mobility and lack of reliance on ground communications which airborne operations supported by close air support can now give. In Burma as many divisions as possible were made air transportable so that they could be switched from one front to another at very short notice. This meant that it was not possible for the enemy to carry out Napoleonic tactics of holding one converging force while striking at another, as we could, by air transport, quickly reinforce any front in difficulties. The operations and movements of divisions in the 1944-45 campaign in Burma have only to be studied to convince anyone of this new and tremendous mobility.

An alternative means, which might be developed in the future to overcome the lack of artillery support, is the use of a barrage of V-1s or V-2s if these have been developed sufficiently to be fired accurately. This would make possible an airborne turning movement combined with the main offensive.

The advent of the atomic bomb greatly increased the importance of airborne forces, as it might be possible to destroy an enemy atomic bomb installation in time to prevent its use against our country, only from the air. History may assess that the raid which destroyed the heavy hydrogen plant in Norway was of more importance in its effect on the outcome of the war than the whole D-day operation put together.

The final picture one gets, therefore, in future first-league warfare, is perhaps attempts first of all by each power to eradicate their opponent's atomic bomb and rocket installations. This might be possible either by small-scale raids in which the raiders have no hope of getting out—unless the technique of glider or man snatching is more highly developed—or a large-scale airborne expeditionary force which descends on or near the atomic bomb installations and attacks and destroys them.

We can picture, then, the first great effort to obtain local air superiority without which it cannot yet be foreseen how an airborne force can penetrate the air defenses of a first-class power, unless the areas are vast; this latter may be the case as it appears to be the fashion to establish atomic bomb installations in isolated areas. After air superiority is gained, an armada of planes deposits on the ground a normal division specially trained for the operation, dropped in parachute-born containers to seize landing zones. Then, on these landing grounds, transport planes with reversible air screws bring in the remainder of the divisions. These planes can land in very small areas by means of a device which reverses the propellers of the planes as they land, with resultant great deceleration. These planes will bring in as artillery the light, non-recoil gun which may take the place of our present medium and light artillery, and specially designed tanks which can be carried by air. All army equipment in the future should be re-designed by airplane engineers whose main factor in design is strength and lightness and not durability.

This airborne army, having made its base and, while receiving its supplies by V-1s which return to their base, or by radio-controlled V-2s, would advance to attack its objective. It might be possible by then to supplement the artillery by rocket projectiles radio-controlled from the forward base. The supply-carrying V-1s, or possibly V-2s would act in place of the 3-ton lorry or landing craft.

If, however, for one cause or another, the attacks on atomic installations are not of such importance as they now seem, the same method of landing an airborne army at the right moment to turn the "third flank" of the enemy from the air, could be used in conjunction with the normal land army to assist in the destruction of the enemy's land forces. But one cannot see any other alternative, except that the attacking force must first of all obtain air superiority, if only for a limited period before landing its airborne army.

Finally, it is emphasized that this full development of airborne warfare does not change the age-old principles of war but gives a further means of attaining the same end, i.e., making possible a third-dimensional turning movement to destroy the enemy's base and lines of communications, and thus destroy the enemy forces in the field. This may be the new means whereby a commander can gain his object.

Time has always been of the essence in warfare but never was it more essential than in our most recent war. With the introduction of atomic and electronic warfare and the astounding advances being made almost hourly in aerial warfare, the tempo is increasing in geometric progression. If war comes to us again the fact seems inescapable that we will not have time to train units before we are faced with the final issue of defeat or victory. Certainly it would be unconscionable to gamble on a fortuitous recurrence of the time to prepare bought by the blood of our allies in 1917 and in 1942.

General of the Army Dwight D. Eisenhower

Tanks in Modern Warfare

Digested at the Command and Staff College from an article by Colonel Ivan Krupenin in "The Tank" (Great Britain) November 1945.

THE concluding period of the first world war proved that the tank had a great future and that it would play an important part in the development of military art and bring about vital changes in future operations.

Tanks of those times, small in number and poor in quality, were not able to effect an operational breakthrough. What they did do was to increase the striking power of the infantry during the breakthrough of the fortified areas, and once more retrieve for the battlefield the main factor which spells success—surprise.

In the first world war tanks did not help military art to emerge from a positional blind alley to open ground, but they did point the way as to how this could be achieved.

Every country drew its own conclusions from experiences of the first world war. Many theoreticians appeared with plans of big tank units and pictures of the future war operations. Ten years after the first world war various countries began forming strong tank and mechanized units for experimental purposes. As a result of her defeat in 1918 Germany lagged behind in this development. But when Hitler came to power he decided to overtake other countries. From then on the book "Tank War," by the Austrian General Eismansberg, published in 1934, outlining the tank blitzkrieg, became the guide of every German officer.

Nazi Germany also gave prominence to her own propagator of lightning war, General Guderian, who later commanded German tank armies, routed on the Soviet-German front. Guderian made no amendment in Eismansberg's theory. He considered infantry an auxiliary branch able only to consolidate success; the air force was to take the place of the artillery and to pave the way for tanks. This adventurous theory of Guderian harmonized with Hitler's strategy.

The blitzkrieg method led the Germans to stake their chances on mobility of tanks, and that pre-determined their equipment. Principal types of machines of the Panzer divisions at the outbreak of war were the T.2, T.3, and T.4, tanks, with their light armor and small caliber guns.

Russian military minds worked on tank designs even before the first world war, but they got no further than building a few experimental types, due to the inertness of the Czarist Government. The Russian army had no tanks in the first world war or in the civil war. Not until the Five-Year Plans were formed did Russia have a tank industry.

In defining the place and part of the tank army, the Red Army doctrine drew its conceptions from the principle of cooperation of all branches of the army, considering that success in modern warfare depended entirely on the combined efforts of all arms. Red Army leaders held the view that the striking force of tanks and their ability to maneuver deep into the enemy's defenses should be utilized for breaching fortified positions in close cooperation with the infantry, artillery and air force. During the development of the breakthrough the leading role should be played by strong tank forces and mechanized units, which should coordinate their actions with other arms. The Soviet military doctrine also allotted a significant part to tanks in defensive battles.

The battlefields on the Soviet-German front were a good testing ground for the various views expressed on the subject. In the Soviet-German war the Germans attempted to enforce their tactics of tank blitzkrieg. Twenty tank divisions, formed into four tank armies, drove deep into the Soviet Union. The Nazis banked on the elements of surprise and speed. On the fields of the Baltics, Byelorussia and the Ukraine, unprecedented tank engagements developed during which, in the first two months of the war alone, the Germans lost nearly 8,000 machines.

During the Moscow battle the Germans continued their pincer tank tactics, but with strengthened tank armament and more precaution. In the fighting around Moscow in December 1941, tank units of General Katukov penetrated to the rear of the Istra group of Germans and inflicted heavy losses on the enemy. Very severe casualties were inflicted by combined action of Soviet tanks with the legendary cavalrymen of General Dovator.

The numerical tank and aircraft superiority enjoyed by the Germans in the first year of the war did not permit Soviet tanks to play any significant part in the operations of that period. In the second year of the war when Soviet tank factories began turning out ever greater numbers of tanks, the Soviet command was able to employ a strong mobile force for the encirclement and annihilation of powerful enemy groups. Tanks played a leading part in those operations.

Thus, when the Red Army assumed the offensive near Stalingrad in November 1942, tank and mechanized groups enclosed a German group of 330,000 in the area of Kalach, and afterwards in close cooperation with infantry and artillery, helped to annihilate the surrounded enemy.

Beginning with the Stalingrad battle, Soviet tanks began to play an important part. During the large-scale offensive in 1944, tanks advanced at an exceedingly high tempo, thus facilitating the encirclement of strong enemy forces.

When on 24 June 1944, troops of the First Byelorussian Front broke through enemy fortifications, north and south of Zhlobin, tank and mechanized units introduced into the gap, closed in on the German Bobruisk group (five divisions) three days later, and then secured the rout of the Nazi force. On 3 July, tank and mechanized troops of the same Front, in cooperation with the armies of the Third Byelorussian Front, closed the pincers in the area of Minsk. As a result of this operation the whole Fourth German Army was routed. During twenty-three days' offensive in Byelorussia, Soviet troops advanced 310 miles west, moving forward at an average rate of eighteen miles a day.

From Warsaw to Poznan Russian tank units advanced at such speed as to frustrate every attempt of the Germans to get established in the intermediate defenses they had previously built up.

Tanks also played a most significant part in the rout of forty-five infantry divisions defending the East Prussian theater. Operations in East Prussia showed that even very strong fortifications built there in years past could not stand up to Soviet mobile tank units.

When in close cooperation with heavy tank units, the army of the Third Byelorussian Front, after five days of heavy fighting, breached forty-two enemy trenches, twelve miles deep, the tanks of General Gudkov, striking to speed up the tempo of operations, turned north and struck on the flank of the fortified area, then just as suddenly turned southwest, by-passed enemy pockets of resistance, penetrated twenty-five miles deep, forced the river, and captured Instenburg from the west, and then circled Königsberg from the northwest and southwest. Meanwhile Marshal Rokossovsky drove a tank wedge with the point directed against Elbing, and the East Prussian group found itself inside the steel pincers.

Soviet operations in 1944 confirmed the correctness of Soviet military doctrine concerning the utilization of tanks—tanks attached to the infantry helped to make gaps in the defenses while strong tank and mechanized units introduced into the breach made a mobile operation and facilitated the rout of the enemy's force.

A German attempt to replace the theory of lightning war by the theory of inevitability of positional warfare, and the invulnerability of walls of various designs and size, also proved a complete failure.

The Decoy Protection of Britain

Digested at the Command and Staff College from an article in "The Fighting Forces" (Great Britain) February 1946.

ONE night in April 1941 the sirens wailed in Portsmouth, heralding another night of terror. Everything pointed to a heavy attack with its consequent loss of life, and damage to ships, homes, and property. The Luftwaffe attacks on London, Coventry, and other towns in the winter of 1940 left no illusions in the minds of people living in vulnerable areas.

The attack commenced—a fairly heavy one for those days—estimated at 144 enemy aircraft operating at short range and carrying a full load of bombs. Then—something happened—after only eight bombs had fallen on the town the attack appeared to shift away: The droning of aircraft and the din of anti-aircraft fire could be heard for a long time, but all the other bombs, many hundreds of them, fell outside the town.

The draw-off of this attack was one of the most conspicuous successes of the decoy protection of Great Britain—a closely guarded secret during the whole war and an important part of the defenses against air attack.

At the beginning of the war the Air Staff realized the possibilities of decoy protection and established a special branch to develop it to draw off air attacks from RAF airfields and stations by day and by night.

The pre-war RAF station, with its concentration of large buildings alongside the open airfield, and the constant movement of aircraft and transport, could not be simulated by any practical form of decoy. But there were at the time a number of satellite airfields, limited in size, and with few, if any, buildings and roads, which it was possible to copy effectively.

Dummy Airfields

Dummy satellite airfields were provided by leveling hedges in open country, and on these dummy aircraft were suitably located, and dummy dumps, roads, tracks, etc., constructed together with real and dummy machine-gun posts and a shelter and trenches for the operating crews. When the real satellites were enlarged and provided with long runways and hutted camps, it was recognized that the dummies could not expect to escape detection much longer, and this was confirmed when an enemy aircraft was shot down during a reconnaissance and a map discovered on which a number of them were marked as decoys. The dummy day airfields were then closed down.

Decoy airfields at night presented a simpler problem, as it was only necessary to simulate the lighting used on true airfields, and to follow its variations during the war. Flat ground was not required, and hedges and arable land presented no difficulties, as lights were carried on poles, and cables buried below ploughing depth.

There was, however, always the risk that our own pilots might be deceived by a decoy and attempt to land on it. To avoid this, certain differences in lighting were arranged, recognizable by our own and American pilots, who were constantly briefed in this respect, but not noticeable to enemy pilots.

The Civil Defense Committee advocated the provision by the Air Ministry of similar protection for civil targets and built-up areas, and to prevent overlapping and mutual interference the coordination of all decoys at night was made an Air Ministry responsibility. Immediate steps were taken for air reconnaissance of the various forms of civil lighting used at night and to experiment with decoy types to simulate them. Only a few civil decoys had been installed when the Coventry blitz, and Hitler's boast that he would rub out our cities one after another, entirely altered the picture. Decoy lighting could do little to draw off those massed attacks, when enemy pilots were able to see their target towns in flames. Only large decoy fires, designed to burn for several hours and to exhibit variations in color of flames, could compete with this form of attack.

Starfish

Experiments were rushed through and it was found that by using three different types of inflammable material, it was possible to build up a large fire which would simulate a conflagration in a town. Decoys of this type which were electrically fired were installed as quickly as possible, and were known by the code name of "Starfish." Some of these Starfish were in operation as early as December 1940, and by the end of the war they had drawn over 100 attacks. Various forms of permitted lighting were simulated including shipyards, railway marshalling yards, coke ovens, and factory and other lighting. Many of these decoys were located on Starfish sites, but others were installed on separate sites with the addition of small fires to be lit if they were attacked.

The greatest secrecy had to be preserved, and only those who were directly concerned were informed of the location of decoys and their object. Much credit is due to farmers and other local inhabitants who must have known the objects of the sites located on their land and on whom the decoy crews were often billeted. RAF crews helped them during the harvest, and special arrangements were made with the Treasury for immediate compensation if cattle or sheep were killed. It is also satisfactory to note that in 730 recorded attacks on decoys only four cases occurred when casualties were inflicted on people living in their neighborhood.

Generally speaking, decoy lighting of all types tended to draw attacks by single or small groups of aircraft, whereas the Starfish fires drew varying proportions of the massed attacks intended for built-up areas. The success of Starfish varied conversely with the size of the target. In the case of smaller towns and isolated targets, decoys could be sited fairly close in, and drew heavy attacks. In the case of very large built-up areas the proportion of draw-off, though not inconsiderable, was less.

One night an attack was launched on Derby and Nottingham. The first half of the attack went astray, and no bombs were dropped on Derby. The second half of the attack struck Nottingham. A Starfish was fired and the attack ceased, though no bombs fell on the Starfish. Instead, it shifted to the open Belvoir Valley some fourteen miles to the east.

We now know that the second half of the attack, seeing the Starfish mistook it for an area of Derby in flames, and turned the correct distance eastwards to where they believed Nottingham to lie. Decoys may therefore draw an attack off a target without necessarily drawing it on themselves.

When we consider the vital targets which most of the decoys were designed to protect, there were many cases when the target was never bombed at all but its decoys were attacked more than once, and many others when both target and decoy were attacked, the decoy drawing off thirty-three to fifty per cent of the total bombs dropped.

Existence Known

The existence of our decoys was well known to the enemy, but they were sufficiently numerous and well operated to defy individual recognition. A map found in Belgium towards the end of the war, purporting to show the location of decoys, was only approximately correct in one small unimportant area. Crews of enemy aircraft shot down during raids often boasted that they knew the position of our night decoys, but when interrogated, were invariably found to be wrong. In fact, the enemy became so decoy-conscious that fires started in the target area early in the raid were frequently avoided by the crews arriving later, who mistook them for decoys and consequently unloaded their bombs elsewhere. Constant photographic reconnaissance would not have discovered decoy lighting, but, in time would certainly have located Starfish sites. The RAF prevented such reconnaissance except on a very limited scale.

Employment of Self-Propelled Artillery

Translated and digested at the Command and Staff College from a Russian article by Lieutenant Colonel G. Khainatsky in "Krasnaia Zvezda" (Red Star) 2 September 1945.

THE self-propelled gun was originally designed for the protection of tanks against antitank artillery, which had developed to the point where it threatened the very existence of the tank. Having limited visibility, and concentrating primarily upon the destruction of hostile infantry, tank crews detected antitank guns only after the latter had opened fire, and since these guns fired at a rapid rate and were effective at ranges of up to 2,200 meters, they could effectively stop a tank attack. Tank units needed close and continuous support.

Field artillery pieces attached to armored units cannot give immediate support. The shield of the field piece is too thin to afford sufficient protection for the gunners, and this type of gun cannot advance with the tanks. The field artillery gunners see even fewer antitank guns than the tank crews see. Their fire must be requested, their targets must be pointed out, and the neutralization of these targets requires more time. The result is that support given by field pieces often comes too late to be effective.

Long before the war, attempts were made to provide support for tanks by forming *tank fire groups*. Moving with the rest of the tanks, this group was supposed to destroy hostile antitank guns by firing from stationary positions. This method was an improvement over field artillery support, but even this method had some serious disadvantages. The *fire group* had to fire from behind the tanks. It moved 400 to 500 meters to the rear of the tanks, and its fire was somewhat ineffective in both penetration and accuracy.

The destruction of hostile antitank guns and self-propelled guns can be effected only by a weapon which is always with the tanks, is equally maneuverable, and excels the enemy's tank and antitank guns in both range and penetration.

With the appearance of self-propelled artillery, the necessity of forming special *tank fire groups* ceased to exist. Equal to tanks in maneuverability and superior in fire power, self-propelled guns became effective support weapons.

Originally intended as a weapon for the destruction of antitank guns, self-propelled artillery soon outgrew this purpose. Reliable artillery support given to the tanks by this new arm made their battle formations less vulnerable to antitank fire and, generally speaking, speeded up the tempo and increased the scope of tank operations.

The maneuverability and fire power of this type of artillery can best be appreciated in fast developing meeting engagements. Direct fire support, flank security (if the flanks cannot be covered by artillery fire), and repelling counterattacks to insure the freedom of maneuver for the tanks, can all be accomplished throughout the entire battle by one and the same unit of self-propelled guns.

Continuous maneuver on the battlefield is the most essential requirement for artillery supporting a tank unit in hostile rear areas. For the field artillery such maneuvering is out of the question, and the number of field pieces required for effective support has to be doubled or trebled. Self-propelled artillery can stand up under a great deal more punishment than towed artillery pieces, and this is especially important in rear area operations where losses in matériel cannot be replaced.

In the spring of 1944, when pursuing the enemy in the direction of Proskurov, the right flank of our armored group was covered by a heavy self-propelled artillery regiment. The Germans launched a counteroffensive, concentrating several tank groups (about 150 tanks) on a broad front. Repelling counterattacks, the regiment fought all along the front for twelve days and blocked German advances in ten different places, covering 300

kilometers over roads made almost impassable by spring rains.

This is but one of many cases which proved the exceptional antitank qualities of self-propelled artillery—its durability, high degree of maneuverability, and fire power. It may be expected that in the future the entire antitank artillery will be self-propelled.

The success of tank units fighting deep in hostile rear areas depends largely on the element of surprise and on the speed of the attack. To wait for the field artillery to come up is unreasonable. Here the advantages of self-propelled artillery are particularly evident. It can always keep up with the tanks.

Self-propelled artillery can accomplish many other missions during a breakthrough. It provides mobile cover for the flanks of tank units; it is used as artillery and antitank reserve; it engages hostile tank and self-propelled guns; it defends positions taken by advance units; and when approaching a defended line, it forms fire groups with purely artillery type missions.

The great number of these missions again emphasizes the importance of artillery support for mobile forces, and the wisdom of providing all tank forces with self-propelled guns is obvious. The belief that the use of organic self-propelled artillery in tank units is not justified, stems from the use of self-propelled guns as tanks or ordinary artillery. This constitutes an incorrect assignment of missions to self-propelled weapons, and as a result neither their maneuverability nor their fire power are properly utilized.

It is obvious that the self-propelled gun makes a poor tank. It must be remembered that its construction is not adaptable to close combat with enemy infantry. It is not designed for this. On the other hand, when self-propelled guns are employed for purely artillery missions and when their maneuverability is not utilized, they are too expensive to operate, too cumbersome, and too difficult to camouflage.

Self-propelled artillery can never stand on equal footing with tanks, nor is it equal to the field artillery. But being a synthesis of both arms, it has acquired individual characteristics of its own, has worked out its own tactics and techniques, and has proved to be extremely effective when properly utilized.

Research of Weapons and Operations

Digested at the Command and Staff College from an article in "The Times" (Great Britain) 12 March 1946.

In 1942 the Army Council appointed a Scientific Adviser. His main function was to carry out research in response to the demands of the various directorates and branches, bringing to his task an impartial outlook and the knowledge and experience requisite for trials and deductions. His purview was not to be confined solely to new weapons and equipment; it was to extend also to the examination and improvement of those already existing.

The post of Scientific Adviser will be maintained in peace. The questions which it will have to tackle may be put under three heads: weapons, logistics, and the soldier.

The "opposite number" to the Scientific Adviser is the Director of Tactical Investigation, who is a regular officer. His duty is to study the application of the results of scientific research to the use of the Army, to examine the information coming in from our own and hostile sources, to advise on the tactical employment of new weapons and equipment and in general to promote the improvement of efficiency. He now works under the Director of Military Training, but maintains touch with scientific matters through the Scientific Adviser.

One of the chief tasks of the Scientific Adviser and his staff is to put more precision

–hard figures when possible—into the nswers to various problems of warfare. part from study of phases of the science of rtillery (such as survey, meteorology, wear f guns, effectiveness of cover) an attempt s made to discover in terms of figures the uch debated relationship between the moral nd the material.

The popular material terms, like "pushing ack," "crushing resistance," obscure the fact hat battles are won by moral ascendance, argely gained by material superiority, but arely by the material superiority alone. The efeated army is virtually always beaten not ecause it has been deprived of the power o continue fighting but because its will to o so has been broken. Napoleon's saying hat—the moral is to the material as three o one has been questioned and even derided. ut, it is a profound truth. Scientific study f the effects of heavy bombardment more han confirms the dictum in figures. The pro-ortion of the defenders whose will to resist s fatally weakened to those who are hysically put out of action is more nearly ix to one than three to one, though estimates ust vary, since much depends on the quality f the troops and the nature of the country.

From the Ardennes fighting some astonish-g figures were discovered about the results f the duel between the tank and the gun. here towed antitank guns, unsupported by fantry, were engaged, one tank was de-oyed to three guns lost; but where the ns were self-propelled two tanks were ac-unted for for each gun put out of action. here the antitank artillery was supported by fantry the ratio was one and a half to e for towed guns, but with self-propelled ns six tanks were knocked out for each n. Another subject investigated was what s in tanks the Germans would accept be-re breaking off an attack. It was found be about fifty per cent. That is a high ure but the Fifth and Sixth Panzer SS rmies were exceptionally good troops.

Battle claims are often somewhat loose. Normandy there was an exceptional oppor-nity to examine them. It has generally been believed that the Mortain counteroffensive was stopped by rocket-carrying aircraft, but this version has been shown to be less than justice to the American soldier with his antitank gun and bazooka. Seventy-eight German tanks were found on the ground, against 252 claimed as put out of action. Of these, twenty-one had been destroyed from the air (by rockets fifteen, by cannon four, by bomb two); twenty-nine had been destroyed by ground weapons; nine had been abandoned intact; four had been blown up by the crews; and the "cause of death" of the remaining fifteen could not be determined. These figures should not, however, obscure the great moral effect of the Typhoons, which had the double value of shaking the enemy and encouraging British and American troops.

It was confirmed that the German losses in all kinds of vehicles, fighting and transport, had been colossal in the final battle. Between the Falaise "pocket" and the Seine approximately 10,000 destroyed or abandoned vehicles were located. On the other hand, it was estimated that 30,000 crossed the Seine, a large proportion of them by a single bridge which was in use throughout. From this and other evidence it appears that "strafing" on the road, however intense, can never stop movement completely. It becomes fully effective only when a block is *first* produced by air or land action. The view has been put forward that much larger scale bombing of bridges and their approaches, or other natural obstacles, is an essential concomitant of "strafing."

Investigations of this nature extended to Burma. Here the effects of close support air bombardment, a particular feature of this theater, were examined. Here again it was found that the main effect was moral, and the tentative conclusion was reached that the ratio of moral to lethal effect was higher for air action than for artillery bombardment. Air supply was closely studied, including features such as the accuracy of the drop and the reasons for bad drops. Another subject to which attention was given was that of the factors affecting rates of

movement in the pursuit after the Japanese defeat in the battles around Imphal.

An example of the work of the Director of Tactical Investigation (DTI) during the war is the appreciation he was called upon to make of the balance of forces and weapons required for the invasion of northwest Europe. A similar study has been made of the organization and equipment required for the post-war army. Some of the most interesting appreciations of aspects of the late war are contained in papers drawn up by the staff of the DTI. They are by no means necessarily General Staff or Army Council doctrine—and take other forms when they have become so after approval—but even where they are turned down they may be of great value. They range from the most general to the minutely particular; on the one hand, the whole question of army-air cooperation and whether and to what extent the Army needs its own air force; on the other, the constitution of a reconnaissance regiment, in which latter case the DTI was called in because the Royal Armored Corps which provides the unit, and the infantry which employs it, had different ideas.

Another paper of the highest interest deals with infantry training, and includes a study of British and American systems of selection and of the standards of intelligence required for officers and NCO's of a national army. It pleads for higher standards, even if their effect should be to lower slightly those of the "learned" arms. Topics such as the illumination of the battlefield, design and tactics of flame projectors, the role of the mortar and the practical limits of its weight, restrictions on tank design imposed by the capacity of bridges and the span of railway lines are among the many subjects to which appreciations are devoted.

Many others must naturally be considered secret, but there is no disposition to conceal the general nature of the activities of the Scientific Advisor and the DTI. They represent an enlightened attitude toward the profession of arms, and the Army, as well as the general public, will welcome evidence of an attempt on new lines to harness experience and expand precise knowledge, so that the most suitable organizations and equipment may be provided.

BURMA NATIONAL ARMY

When the British were forced to retreat to the Burma-India border in 1942, the Japanese raised, trained, and armed some local levies under the name of a Burma National Army to fight for them against the Allies. The Burmese accepted the arms and training, and later they, like the Burma Maquis, fought side by side with the Allies in the common cause of destroying the Japs.

During the Fourteenth Army's drive on Rangoon, the Burma National Army continually obstructed Japanese attempts to form a defense line, blocked roads, destroyed convoys, and delayed or halted the movements of Japanese columns. It ambushed and killed the commander of the 54th Japanese Division and obtained valuable papers. In the Toungoo area in April, one group killed 217 Japs, destroyed twenty-two trucks, cut the main railroad line, put a complete motor train out of action, sank twenty-five Japanese boats, and took many prisoners. On the Toungoo-Pyu road, the Burma National Army attacked a Japanese column of 107 trucks, six tanks, thirty-eight loading carts, and 700 horses. The attack was timed to coincide with an Allied bombing attack and the column was completely disorganized. Troops of the 15th Indian Corps landed on the banks of the Rangoon River south of the city on 2 May, and Burma National Army units in Rangoon went to the offensive, killed Japs in the suburbs, and opened the Insein jail.

(From a British Source)